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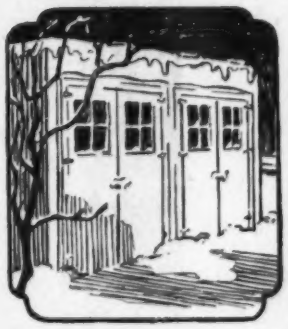

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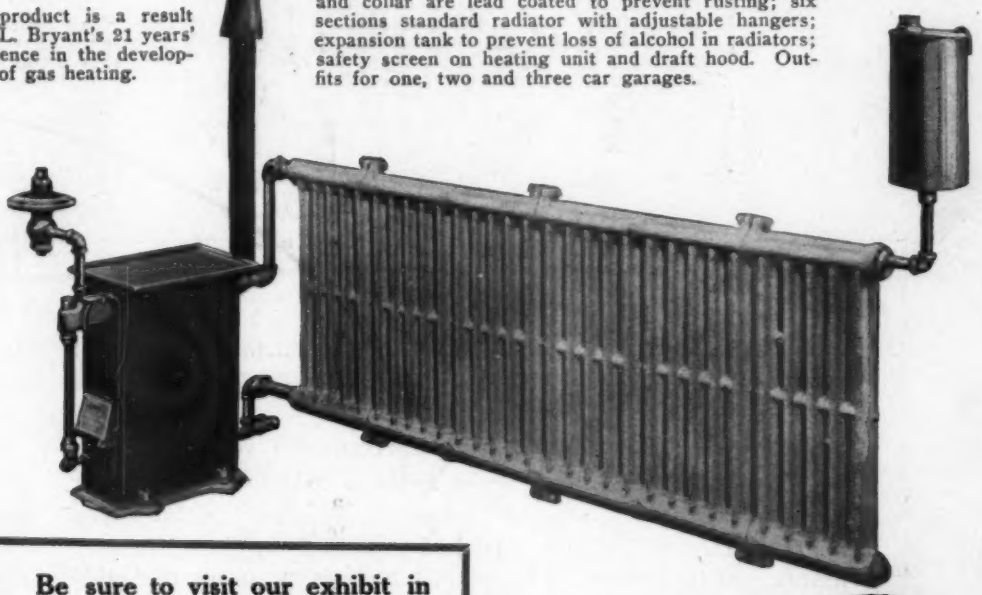

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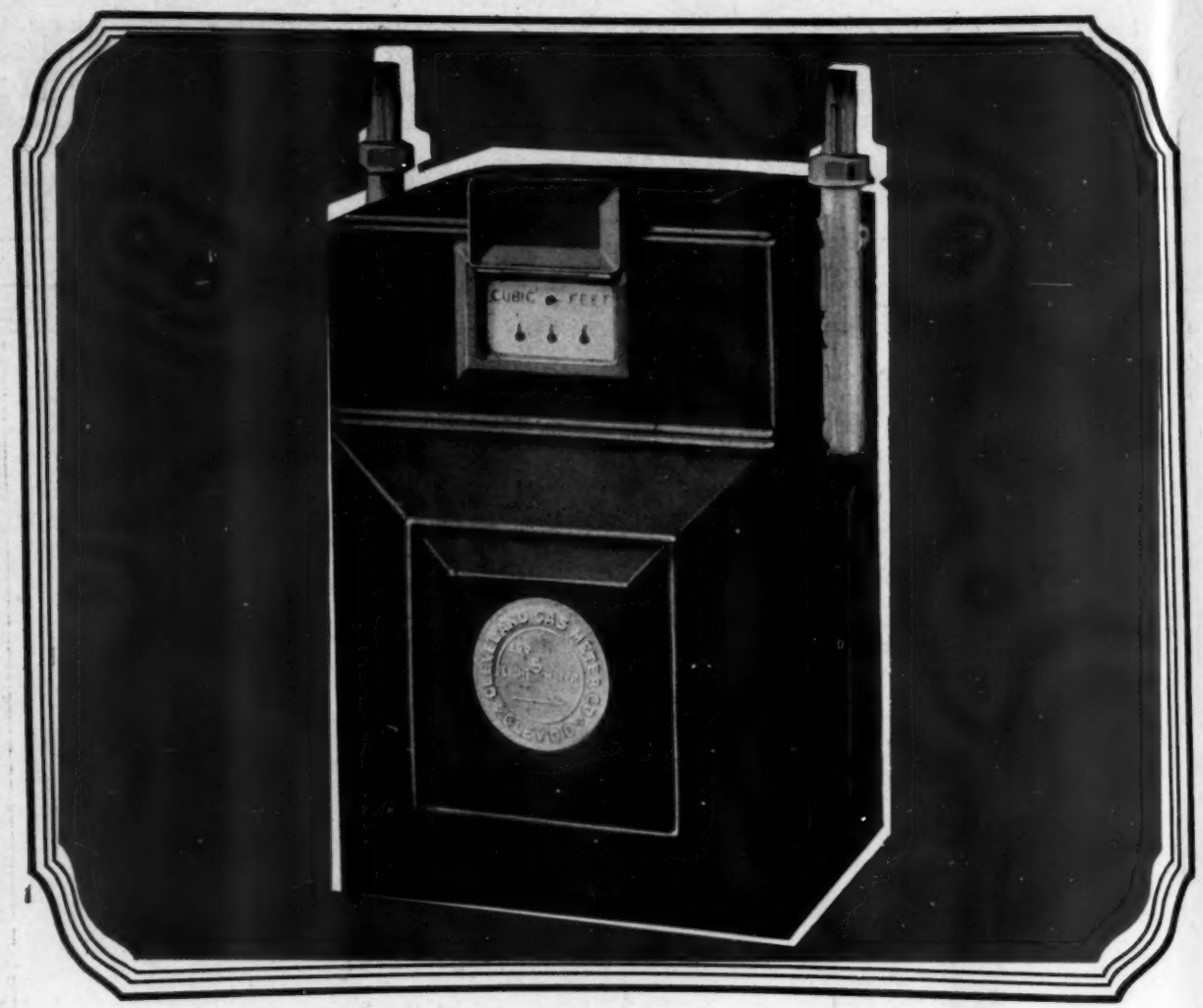

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AMERICAN
GAS JOURNAL

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The Story of Gas

Its history with particular reference to the American Gas Industry

Ismar Ginsberg

GAS is more ancient than the everlasting hills! It is older than the very earth itself! Aeons before our good old Mother Earth had reached the state where life could exist in and on it, millions of years before Man first appeared, a whirling, swirling body of incandescent gaseous matter shot off from those luminous, indefinite masses of gas, existing in the Universe and known as nebulae, and cooling off in the course of time, finally became the Earth. Thus, gas is the first form in which matter existed, the oldest form, and it is interesting to note that it has been possible to establish the presence of certain gases, constituents of the product, with which we gas men are concerned, in the flaming Emanations of the Sun.

Gas men can, therefore, point with pride to the unequivocal fact that that product, whose history and development we will now trace, is in form the most ancient in origin of all known things.

Prehistoric Man and Heat

Earliest man knew not heat. Perhaps the single, most important step in Man's progress was when he first learned to know heat, to understand how he could obtain it and use it to protect himself against the cold and his enemies, how he could employ it to fashion metal into weapons and utensils, and finally how he could apply it to cook his food and light his habitation.

When did man first learn to cook his food in place of eating it raw? Ages passed before he reached that stage in his development. Before this, he had learned much about fire, how he could produce it by rubbing together a couple of dry sticks or by catching the sparks that fly off when flint is struck.

The Classic Tale of Man's First Taste of Cooked Food

Who does not recall that immortal story, written by Charles and Mary Lamb, of the first discovery of the fact that roast pork was far more palatable and better food than the raw pig! There is more truth in the fable than might first be supposed, for undoubtedly the discovery of cooked food was an accident.

Just such an accident as when the frightened Chinese boy inadvertently set fire to his father's house and consumed his worldly goods, among which by far not the least valuable was a litter of pigs. The boy, burning his hands on the roasted carcass of his pet pig, characteristically put his scorched fingers into his mouth to cool them off and found to his great astonishment and delight that the taste of the roasted pig was immeasurably superior to that of raw meat. Then how characteristic the touch that laws had to be passed to prevent the people from burning down their houses to roast their porkers, until a superior intellect conceived the fact that entire houses need not be burned down to cook food, it being possible to do so by building a smaller fire at less loss of property.

Such is the classic story of the discovery of cooked food. The effect that it had on the character of man's life was more than epoch-making. It was the first real step in his civilization. He then abandoned his lonely, wandering existence to gather around the common cook-pot in family and communal groups. It started him on the long road of gradual progress and advancement, of improvement and development, and through the lessening of the potency of the predominating animal instincts in his nature to the attainment of the refinements and advantages of civilization as it exists to-day.

Cooked Food the Pre-eminent Civilizing Agent

Cooked food was the civilizing agent at the time. It formed the nucleus of home life which it still is to-day. The cooking agent has gradually been improved from the crude fire made from wooden sticks to the coal fire and the coal stove and finally to the

modern gas range, with all its conveniences and comforts—the soul of the kitchen, the humanizing element in the home, the cement that binds fast the real, fundamental corner-stone of the structure of civilized society—this, the happy home, made so, perhaps more by the well-cooked home meal than by any other agency.

Thus gas occupies today the position that "heat" itself first filled when man turned from eating raw meat to cooked food. Simultaneously with the development in cookery went the use of fire for purposes of illumination. Progress was slow at first in both. The Egyptians knew much about cooking food as far back as 4000 B. C. As early as 1600 B. C. the great Pharaoh, Rameses III, ate food fried on griddles and boiled in pots. Assyrians and Babylonians knew how to cook over small braziers and bake in cylindrical-shaped stoves.

The Romans Were Fine Cooks

The first real connoisseurs in cooking were the Romans who developed it into a fine art. Yet, after the fall of the Roman Empire, the fine cookery of the Romans was utterly lost and during the Dark and Middle Ages the table manners of the Europeans

LATEST GAS IRON, at top (right), with other various antique types.

and their methods of preparing food were no better than those of the barbarians who preceded the ancients. Thereafter, the art of cooking again entered its renaissance and gradually developed to the high state of perfection it eventually reached through the use of gas as a domestic fuel in that wonderful modern refinement of comfort, that supreme cooking utensil, the gas range.

The Story of Illumination

Man learnt the value of illumination much later than he first began to understand the use of heat for cooking his food and fashioning his utensils of attempt to secure illumination was by burning pine peace and implements of war. Probably the first knots or bundles of wood. It was likely not until the year 1450 B. C. that "fire pans" or "censers" were used in illumination, the first artificial system of lighting devised. The next step was the use of oil lamps which were saucers with wicks dipped in animal oil. This took place about the year 500 B. C.

It is interesting to note that the first mention of street lighting is found in the writings of St. Jerome who stated that certain streets of Jerusalem and Antioch were lighted at night. This was in about the year 400 B. C. One hundred years later is found the earliest mention of the existence of the substance, known later as coal. This is found in the writings of the Greek philosopher, Theophrastus.

Coal the Source of All Heat

Thereafter, the development of heating and lighting is intimately connected with the progress made in the location of coal in the Earth, its mining and utilization. As man came to realize that in coal was the source of all heating and illuminating means, real advancement began.

Thus in the year 852 A. D. coal is first mentioned in England in the Saxon Chronicle of the Abbey of Petersborough. By this time candles were generally employed, the lanthorn being invented by King Alfred, who lived between the years 848 and 900 A. D. Around the year 1000 coal began to replace wood and charcoal. Thereafter, the development in the utilization of coal was fairly pronounced, coal being mined systematically in England in 1180; in 1250 it became a commercial commodity. In 1259 the first charter was granted to a coal mining company in Newcastle and in 1272 coal was used in London.

It is interesting to note that as early as 1316, the disadvantages of coal as a fuel were recognized, for a royal proclamation was issued in that year forbidding the use of coal in London because of the "noisome smell," produced when it was burned.

Street Lighting in London of the Middle Ages

Lighting was developing at the same time. Street lighting became a regular practice in London in 1415. Lights were ordered to be hung out on winter evenings between the feasts of All-Hallows and Candlemas.

This practice was continued for over three hundred years, but it was not generally observed by the townspeople, with the result that when people went out at night they had to carry their own lights or hire linkboys to light their way. In those days, in the pitch darkness of the streets of the larger European cities, banditry and highway robbery abounded. General lawlessness prevailed and conditions only began to improve when more general lighting of streets was impressed on the minds of the city authorities as a sure way to combat the evil that prowls about at night.

"Let There Be Light"

"Let there be light" has ever been the cry of mankind. Light dispels the evils of darkness. To-day, we appreciate thoroughly the necessity of well lighted streets, and in the heyday of lighting with

gas, this product of ours proved its value as Man's servant. To-day, though its use for general illumination is not what it used to be, it still possesses advantages as a lighting medium which are not to be found even in electricity.

To proceed with our story, as the seventeenth century was ushered in, things began to improve in the art of illumination. Lights were first made of ropes soaked in pitch, which were set in iron frames. The year 1694 saw the foundation of a company to supply glass lights.

Prejudices, however, still prevailed against the use of coal. Good Queen Bess, the Elizabeth of History, with real womanly solicitude for her Knights and Princelets, ordered the prohibition of the use of coal in London during the time that Parliament was in session, because, as it is recorded "the health of the Knights of the shires might suffer during their abode in the Metropolis."

Other important developments were meanwhile taking place in fields which afterwards became allied both with coal and gas. Chemistry was just about creeping out of its shell of mysticism and alchemy and entering the realm of actualities. The three most important chemical reagents employed in industry, as they still are to-day, namely, the acids, sulphuric, muriatic and nitric, were discovered by Brazil Valentine in 1500. Forty-one years later Paracelus discovered hydrogen gas. In the year 1560 special licenses were issued for making charcoal and smelting iron.

The Christening of "Gas"

As we read the history of gas, we become aware of its close inter-relation with general progress in human knowledge and of its connection with the development of those two primary sciences on which all manufacture and nearly all human enterprise are based, viz: physics and chemistry.

Yet gas was not so named by a chemist or a physicist, but by the fore-runner of the two, the alchemist.

Gas and Alchemy

There have been two thoughts, two hopes, two objectives, that have had more influence than any others on man's life and progress, since he learned how to turn to his advantage the riches that he found in earth and to change them into articles of utility and comfort. Ever since the early Greeks, in whose writings and very religion we see these two phantasies reflected, the search for the elixir of life, to quaff which bestows immortality, and the hunt for the philosopher's stone whose touch turns everything to gold, what has been more potent?

The searchers, the investigators, the workers of magic, the mystic wizards, the would-be producers of miracles, are known as alchemists. There was a school of alchemists in Alexandria, Egypt, as early as 50 A. D. They, in their attempt to transmute the metals, to concoct mixtures that would successfully ward off the inevitable coming of the Dread Reaper, unknowingly laid the foundation of that wonderful science of chemistry and the practice of medicine, and of the apothecary's art. And one of these alchemists gave gas its name.

Van Helmont Names Gas

It was in 1577 that the erstwhile physician and subsequent alchemist and chemist, Baptist Van Helmont, was born in the city of Brussels. He was an earnest worker and finally believed that by dint of hard work he could find that most precious of all stones, that open sesame to the wealth of the world, the means of changing base metal into gold. Strange to say, the impossible has since been accomplished, or soon will be! It has recently been reported that metals have been transmuted, base matter changed into noble gold!

It was while working in his alchemical laboratory that he one day made a marvelous discovery. He was heating something in a crucible and it "did belch forth a wild spirit or breath." This he called "geast" by its Dutch name or "geist," as in German, literally ghost or spirit. For so it seemed to his frightened senses. To-day, we know it as gas, a name given to the aeriform bodies emanated during combustion, termentation and chemical reaction. In his own words, he says:—"seventy-two pounds of oak charcoal gave one pound of cinders, and the seventy-one pounds remaining served to form the spirit Sylvester," a remarkably accurate statement of what actually happened.

Thus gas was named. Its naming was shrouded with mystery, its very cognomen reeking with it. For many years its development was hampered by the very nature of its origin, which appeared supernatural to the average mind. Its early use was surrounded with superstition and fear. People were frankly afraid of it. It was due to the remarkable courage and tireless energy of the early gas men that the multitudinous objections to it were overcome and silenced. It is still the task of modern gas men to overcome the prejudices that persist against it today, which, who may know, may find their real origin in and form an inheritance from our ancestors, who looked upon it as a ghostly body, somehow associated with the evil spirits of darkness and abomination.

Natural Gas Known Long Before Manufactured Product

While Van Helmont was the first to observe the formation of gas in the heating of carbonaceous materials, nevertheless people knew about gas many years before he performed his experiments. The ancients were aware that a strange, ill-smelling substance arose from the earth in certain places. The fact that this substance was of unusual character and that sometimes it was caused to burst into flame by lightning discharge surrounded it with fancied, mystical properties and made it an object of abject fear. It was then an easy matter for priestcraft to endow it with supernatural qualities and to use it as a

means of controlling the minds and actions of the people. Thus it became a part of the religion of the masses.

It is now known that in the famed Greek oracle at Delphi, which was consulted by statesmen and warriors, as well as by the commoners of Greece, before starting forth on any important undertaking, and whose advice, given in the well known cryptical form which carried both a negative and a positive interpretation (so as to be right always), was considered of great value, the active agent was a natural gas. The gas rendered those who breathed it lightheaded, and the simple minds of the people immediately associated the place with a god. Thus "gas became the oracle of the gods."

So, both natural and manufactured gas possessed mystic beginnings. So strange were these substances, and so little did they suggest material things, not to say the possibility of practical usage, that they were instinctively shrouded with metaphysical properties and associated with unearthly things and beings. It is, therefore, no wonder that it took centuries before any practical use was made of them.

The Chinese and Gas

Perhaps no people have had such a wonderful history and civilization as the Chinese! They have been reported to be the originators and first in many fields of human endeavor. It is, therefore, not altogether strange to learn that they are refuted to be the first to make practical use of natural gas. The latter was found in soft coal beds near Pekin and was distributed through bamboo pipes to salt works, there to be employed in heating the pans of salt water so as to evaporate the water. The salt was then recovered. It is also claimed that the gas was piped into Pekin and employed for lighting.

Another story states that the Chinese used gas for lighting as early as 900 A. D., but that their gas was in reality petroleum vapors. It was similarly distributed through wooden,—bamboo pipes.

The first scientific investigation in natural gas was conducted in 1662 in England, by Thomas Shirley, who published his findings in the Transactions of the Royal Society, June, 1667. His quaint statement that he found "a water that did burn like oyle" and "did boyle and heave like water in a pot" and that therefrom he found to arise "a wind which ignited on the approach of a lighted candle," shows that he also was not a little astounded and perhaps mystified by this strange substance.

By this time, however, coal was being used extensively and all the old objections to its use had been overcome, simply because the benefits derived from it were too great to be overlooked. In the year 1675 coal was first distilled for the production of tar.

A Clergyman Strips the Mystery from Gas

The next outstanding figure in the history of gas is a Yorkshire clergyman, Dr. John Clayton. He possessed a scientific bent of mind and he succeeded in ridding gas of much of its mystical, elusive nature through a series of remarkable experiments which lasted from 1660 to 1670.

His attention had been called "to a weird flame, a yard wide and two yards long, that burned, nobody knew why, incessantly in a Whitehaven coal mine. The workmen did not know what to do with it, so they built a chimney-like structure around it, and carried the blaze to the top of the pit, where it sprang forth high over the mine, lighting the country for miles around."

As might have been expected, it excited great fear and dread around the countryside. But the worthy Doctor, fortified no doubt by clerical experience in battling the forces of darkness and evil, would have nothing of this story. He set about emulating nature and putting some coal in a retort, he set it on fire.

An Unexpected Explosion

The result was rather unexpected, to say the least, for a violent explosion ensued, which not only rumpled his clerical habitments, but smashed his spectacles. But imbued with the true spirit of the investigator he continued his experiments and finally reached the stage where he could collect the gas in bladders. Then to entertain his friends, and undoubtedly himself through their consternation at the sight, he would prick the bladder with a pin and ignite the gas issuing forth.

But he made no practical use of his innovation. To him, after all, it was little more than a plaything. People of his time were not really ready for gas. Their minds were still too much occupied with beliefs in spirits, evil demons and the like, and they were too apt to assign superstitious cause to anything that was new to them, or not of the ordinary. This state of mind was responsible for the delay of more than a hundred years before practical use of gas was first made.

Before this took place, however, it is necessary to reveal certain other important co-related events which happened during the latter part of the seventeenth century and the greater part of the eighteenth century.

First Mention of Coal In U. S.

Thus in 1667, a royal ordinance was issued in Paris commanding the lighting of streets by candles set in glass boxes. In 1679, there is found first mention of the existence of coal in the United States, a "cole mine" near Ottawa, Ill., being reported by Father Hennipin, a Jesuit missionary. In 1681 British patent No. 214 was granted to John Joachim and Henry Serle, on "a new way of making pitch and tarre out of pit coals."

New York was one of the first cities in America, if not the first, to pass an ordinance requiring the lighting of the city streets. This was in 1668. The ordinance set forth that "every seventieth house in all streets shall, in the dark time of the moon, cause a

lantern and candle to be hung out on a pole." It was further ordered that "on dark nights all inhabitants shall place a lighted candle in their windows."

In 1700 coal began to be exported from England to European countries. In 1716 Guthsmann, who was librarian to the King of Portugal, invented an apparatus for cooking meats and baking bread by the heat of the sun's ray. In 1726, Dr. Stephen Hales published the results of his experiments on the distillation of coal. In 1744, Benjamin Franklin constructed the box stove called the "Pennsylvania Fireplace."

The year 1745 saw the first use of oil lamps in the streets of Paris, while four years later coal was first mined in Richmond Basin, Virginia. In 1755 coal was discovered in Ohio. In 1762 a plan was authorized for installing lampposts in the streets of New York, and eight years later the first oil lampposts were erected.

Tea Kettle on Coal Fire First "Gas Plant"

The facts surrounding the first experimental production of gas as well as its first use on a practical, commercial scale are not very clearly defined. In this respect gas is no different than any other important invention or discovery. Many claimants are always to be found to assert that they were the originators, the first to see the value of a new invention and suggest its application as a servant of society. Even in our own times we find such a situation to exist, as for example, in connection with radio broadcasting.

So it is not surprising to find that there is considerable confusion regarding the first application of gas as a lighting agent. There is, however, no question that gas was first used for lighting purposes and that its application as a fuel came later.

The Experiments of George Dixon

In the middle of the eighteenth century, as early as 1760, George Dixon, a colliery owner of Durham, England, while experimenting with the distillation of coal to make tar, produced an inflammable gas which he endeavored to adopt to illuminate his house.

His nephew, John Bailey, describes his early experiments in these words:

"I remember being very much amused, when a little boy, by George Dixon filling an old tea-kettle half-full of coals and setting it on the fire and luting hollow hemlock stems with clay to the spout, and to these several others round the end and side of a room; after a certain time he put the flame of a candle to the end of the farthest pipe, and immediately a bright flame issued from it, where nothing was visible before. He then made a small hole with a pin through the clay that luted the pipes together, and applying the flame of a candle to each, there were as many little flames as holes. He had only made the discovery a little before, and this was probably the third of fourth exhibition of illuminating rooms by gas light.

How George Dixon Experimented with Gas

Explosion Ends Experiment

"This mode of lighting rooms was for a long time a favorite project with him, and he had thoughts of lighting his collieries with them, but was cured of it by the following experiment, at which I was present: Wanting to know the quantity of tar produced by a ton of coals, he erected a furnace with a large cast iron boiler, in which the coals were put; to this were fixed two large cast metal pump tubes. One of them was passed through water in order to condense the

oil and tar; the end of this was filled with a wooden plug, with a small hole to let out the tar, etc. Towards the conclusion of the experiment he placed the flame of a candle to this hole. The inflammable gas immediately burned with a large flame to extinguish which he struck it with his hat. The flame was driven inwards, the gas on the inside of the apparatus took fire and exploded with a report like a cannon, driving out the wooden plug to a great distance and exhibiting a cylindrical body of flame of several yards length."

The Advent of Murdock

Dixon's work was of great importance and interest, but no really practical application was made of it. It amused him and he made some use of it, but the unfortunate termination of his experiment thoroughly frightened him and led him to the conclusion that "discretion was the better part of valor," and

William Murdock
The First Gas Engineer

accordingly he abandoned all idea of making any practical use of what must have appeared to him a very dangerous, if novel, plaything. Thus ended the first gas plant!

Between the time of Dixon and Murdock, chemists and physicists were busy experimenting, discovering fundamental laws and principles and laying the real foundations of these sciences. This work, antedating Murdock's experiments, was undoubtedly of great assistance to him.

The Gas Holder Invented

Thus in 1767, Henry Cavendish discovered that hydrogen gas could be obtained from water, and in 1774 Joseph Priestly discovered oxygen. Two years later he invented the water lute or water seal, one of the principles on which the gas holder is built. In 1781 Lavoisier invented a gas holder.

In the year 1784 we find another experimenter using gas as an illuminant but merely for a lecture demonstration. This was the Belgian scientist, Jean Pierre Minckelers, Professor at the University of Louvain. He studied the distillation of gas from coal and one day surprised his class of students by lighting the lecture room with the gas he made in his crude apparatus.

Then again, it is recorded that three years later Lord Dundonald distilled coal to obtain tar and oil and used the gas, simultaneously evolved, for lighting the hall of the Culross Abbey. This lord was, however, a mere dilettante. He was just amusing

Boring Logs for Pipes
Used in Early Days of the Gas Industry

himself one day, pushing his "plaything" too far—a common practice amongst those who understand not what they play with—he very nearly killed some of his admiring and interested friends when his "toy" balked and exploded. This ended his desire for further amusement with gas.

Murdock and His Wooden Hat

Thus, it appears that Murdock was by no means the first to distill gas from coal and to use it as a lighting medium, but there is no doubt that he was the first to realize the real possibilities of this new product and to attempt to make practical use of it.

William Murdock was a Scotchman, who was born in 1754 at old Commock, Ayrshire. He started his career as a construction and erection engineer for James Watt, the inventor of the steam engine. It is said that he was a rather queer young man, who indulged in the strange habit of wearing a wooden hat, just for what purpose nobody seemed able to explain. He undoubtedly was a genius of the first order and he devoted his entire life to solving the problem of making gas serve as an illuminant.

He began experimenting in 1792. In that year he distilled coal in an iron retort and conducted the gas that was formed through seventy feet of tinned iron and copper pipes to light his house and grounds at Redruth in Cornwall.

It is stated that his first successful experiment was with a portable gas lantern. He made his lantern by fixing a tube in the neck of a bladder filled with gas. His travels about the streets at night with this strange "headlight" excited much attention and the good folk were imbued with apprehension that all was not very well with young Murdock and his constant companion, gas.

Sewing Thimble, the First Gas Burner

An interesting story is connected with the development of the first gas burner. Murdock's first burner was merely the end of a tube. He lighted the gas issuing forth and it burnt with more or less light. One day he wanted quickly to extinguish the flame. In his haste the first thing he laid his hand upon was his wife's thimble. He thrust it quickly over the gas flame and it went out. But as a strong smell of gas persisted, he applied a light to the thimble and found that it was full of holes through which the gas streamed forth in tiny jets of flame. He noticed at once that the illumination obtained from these small jets of flame was much greater than that obtained when the gas was burnt as it issued forth from the open end of the pipe. This discovery eventually led to the construction of the first gas burner.

Murdock An Important Factor in Steam Engine Development

Murdock was a hard working young man and when he was not experimenting with gas, he was working on steam engines. The well-known "D" slide valve was his invention, which is employed in gas meters as well as on steam engines. Prior to the time that he lighted his house with gas, he received a weekly salary of twenty shillings, but when his reputation as a "practical" inventor was established his salary was raised to twenty pounds a week. This appears to be from all accounts all that he made out of his inventions. His work on the development of the steam engine was almost as important, if not equal in importance, to what he did along gas lines. There seems to be no doubt but that he led a rather eventful life and that he was always engaged in experimenting and testing out all kinds of new ideas.

In the year 1797 Murdock lighted his office and house with gas at old Commock, and in 1798 he used gas for illuminating one of the Boulton and Watts' shops at Soho, near Birmingham, England. In the April of 1802 he gave a public display of lighting at Soho to celebrate the Peace of Amiens that ended the war between England and France. The display attracted wide attention and many people began to think that there was something in the new lighting agent, gas.

The Wonders of Gas Lighting Shown at Soho

The spectacle, which was the first really successful gas lighting installation, is described in these words by an early writer, Matthews:

"The illumination of Soho works on this occasion was one of extraordinary splendor. The whole front of that extensive range of buildings was ornamented with a great variety of devices that admirably displayed many of the varied forms of which gas light is susceptible. This luminous spectacle was as novel as it was astonishing and Birmingham poured forth in numerous population to gaze at and admire this wonderful display of the combined effects of science and art. The writer was one of those who had the gratification of witnessing this first splendid public exhibition of gas illumination and retains a vivid recollection of the admiration it produced."

In the year 1804 Murdock built a gas works and lighted the cotton mill of Messrs. Phillips & Lee at Manchester with 900 burners. In 1808 he read a paper describing this gas installation before the Royal Society and was awarded the Count Rumford Gold Medal. In 1839 Murdock died, having accomplished much to start gas on its long journey toward the attainment of its goal, the universal fuel for all purposes.

The Work of Winsor and Contemporaries

While Murdock was experimenting with coal gas, other experimenters and investigators were also working to develop this product of coal distillation

Frederick Albert Winsor

Promoter and Entrepreneur, the Founder of the World's First Gas Company

into a practical lighting agent. Thus, in France, Philippe Lebon was most active and successful. In

September, 1799, he obtained a patent for making gas by distilling coal and wood, and two years later he used gas for lighting his house and gardens in the Rue St. Dominique, Paris.

But the man who, it may be said, saw even deeper into the future of gas than Murdock or any of the other early gas men was Frederick Albert Winsor. Winsor was a German and having heard of Lebon's experiments in Paris journeyed thither to learn more about them, but was not given a chance to secure further information on that "common smoke which did burn with greater brilliancy and beauty than either oil or wax." Possessed of real German persistency, however, he worked the problem out for himself and soon succeeded in demonstrating by experiments in Brunswick that lighting could be accomplished with gas distilled from wood. He afterwards went to London and it was there that he performed his real work in starting the English gas industry.

Winsor the Promoter and Entrepreneur

Winsor was much more of an organizer than a scientist. He became tremendously enthusiastic about the possibilities of gas and he saw more clearly than any of his contemporaries the part that gas was eventually to play as a lighting and heating medium. He proposed enterprises which seemed far-fetched even to the Father of the Gas Industry, Murdock, who at one time strenuously opposed him. Winsor was the first to suggest the distribution of gas for lighting from a central point, and he was the originator of an enterprise to furnish the inhabitants of London with gas. In fine, he was instrumental in founding and organizing the world's first gas company.

The First Gas Company in the World

Winsor came to London in 1803, and a year later he obtained the first English patent as a gas-making apparatus. The same year he gave a public exhibition of lighting by illuminating the Lyceum Theater in London. The London Times of July 2, 1804, published a glowing description of the demonstration.

Winsor had visions and he possessed the courage of his convictions. But not so the men and women of his day! Not that just the ignorant were afraid of this newly developed servant of man, but the intelligent laughed at him and ridiculed him. To them gas was smoke. What folly to light London with smoke! This, the sentiment of the famous author, Sir Walter Scott, who apparently knew little about scientific matters. The conqueror of Europe, Napoleon, dismissed the entire matter in regal disdain with a mere terse remark: "Une grande folie" (a big fake!)

Such is the fate of those who look far ahead, who live in the future rather than in their own time. "Winsor and his smoke" became fine meat for the humorists in the daily and weekly publications and for the actors on the stage. But he persevered and in spite of all opposition worked on and finally was rewarded with well-merited, hard-earned success.

Pall Mall, London, the First Street Lighted With Gas

In December, 1806, he laid leaden pipes in Pall Mall, the first gas mains laid in a public street. On January 28, 1807, the first street lighting by gas was on the one side of Pall Mall and on June 4 the other side was illuminated. On July 12, 1807, there was held the first meeting of gas stockholders and a proposal was made to incorporate the National Light and Heat Company of London. When Winsor made application to Parliament for a charter, both Murdock and Watt opposed it, but finally, in 1810, a petition to incorporate the London and Westminster Gas Light & Coke Co. was made to Parliament, and in April, 1812, this company was granted a royal charter.

Fig. 4.—The Original Type of the Lucerna.

Thus Winsor won out and the first gas company in the world was founded!

The Work of Samuel Clegg

Samuel Clegg was a pupil of Murdock at the Soho works, in Birmingham. While Winsor was dreaming of the future of gas, prophesying that the time will come when it will be used for lighting, heating, for power purposes and in the chemical arts and at the same time working with might and main to get started the first gas enterprise in the world, Clegg was also busying himself with gas, but with another phase of the business, the technical and engineering side of this fuel. He was what might be called the first gas engineer, and he had but little to go by, and literally had to invent and devise all the apparatus he used, both in the manufacturing plant, in the distribution of the gas and in its use.

In 1805, Samuel Clegg built a gas works and lighted

the cotton mill of Messrs. Phillips and Lee at Manchester. Nine hundred burners were supplied with gas. In 1809 he read a paper on the application of gas lighting in mills and factories, and was awarded a silver medal by the Society of Arts. While in 1806 Edward Heard patented a process of using lime as a purifier, Clegg introduced the wet lime purifier in 1809 and the hydraulic mains in 1812.

The next year he became engineer of the London and Westminster Gas Light and Coke Co., and his great ability as an inventor and engineer were so amply manifested in his work for this company that he has come to be considered to have done more for the progress of the gas industry from this standpoint than any one other individual.

Clegg Invents the First Consumer's Meter

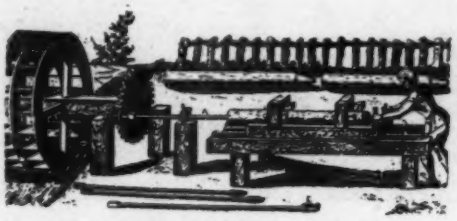
In 1815 he invented the first consumer's gas meter and in the same year he obtained a patent on a rotary retort.

In 1816 he invented a wet meter with a revolving drum and in 1817 he perfected the first cylindrical gas holder.

But in spite of all these improvements the progress of gas was slow. After all, it had to be sold to the public and the public was frankly afraid of this evil-smelling substance which appeared to it endowed with mysterious, even if useful and very wonderful, properties.

The Sneers of the Intelligent, the Savants

But, as has been said before, the intelligent people, in fact, the scientist himself, as illustrious a savant as Sir Humphrey Davy, known for many discoveries and inventions, among which not of the least important was the miner's safety lamp, sneered at Clegg's efforts and asked in ridicule if he intended next to use the dome of St. Paul's Cathedral for a gas holder. Clegg answered that he hoped to see the day when they would be made not smaller, and his hope was gratified, for before he died in 1861, gas holders were being made 200 feet in diameter (the diameter of the dome is 145 feet).



Improved Pipe-Boring Machine

After it had been demonstrated in a practical way that gas was an article which could be merchandised at a profit and that the gas business had come to stay, progress in the British gas industry was very rapid. Other companies were organized rapidly and by the year 1829 there were over 200 gas works established in Great Britain. Among these may be mentioned Liverpool in 1816, Manchester in 1817, Sheffield, Glasgow, Edinburgh in 1818, Bristol and Birmingham in 1819, Belfast in 1822, etc.

The Gas Industry in France and on the Continent and Elsewhere

Paris recently celebrated the hundredth anniversary of the French gas industry. Lebon was the first French gas investigator. He was assassinated in 1804, twenty years before gas became an established fact in France, because of his resemblance to Napoleon, who (irony of fate!) had dismissed the entire gas proposition with disdain.

The first proposal of gas for lighting purposes was in 1819 in Paris. The same year gas lighting was introduced into Brussels. In 1822, Munich, Germany, saw gas lighting for the first time; in 1825, Amsterdam, Ghent and Rotterdam; in 1827, Berlin; in 1833, Vienna; in 1835, Bologne, Italy, and St. Petersburg, Russia; in 1838, Nantes, France, and Leipsig, Germany; in 1840, Montreal, Canada; in 1841, Sydney, Australia; in 1845, Madrid, Spain; in 1852, Buenos Ayres, Argentina; in 1855, Vera Cruz, Mexico; in 1851, Copenhagen, Denmark; in 1862, Hong Kong, China; in 1863, Smyrna, Turkey; in 1865, Bombay, India; in 1868, Ceylon; in 1871, Yokohama, Japan.

Thus the use of gas spread around the world!

The American Gas Industry

London was the first city in the world to use gas for lighting, and Baltimore, the city of "first achievements," has the great honor of being the first city in America to found a gas company. The first event took place in 1807 and the latter event in 1816.

But demonstrations of the use of gas as a lighting medium had been given before this in the United States. It is claimed that the first experiment made with gas as a lighting agent was carried out in the city of Philadelphia in August, 1796. This was just four years after Murdock first made his initial experiments with gas. It is related that M. Ambroise & Co., Italian makers of fireworks, conducted the Philadelphia demonstration.

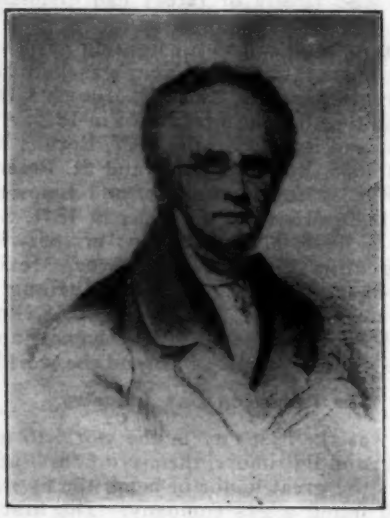
Richmond, Virginia, also claims to have been the site of gas lighting demonstration as early as 1803. It is said that a huge gas lamp was erected on a forty-foot tower in one of the city's main streets. This was four years before Pall Mall, London, was illuminated with gas. But these attempts to introduce gas lighting were premature and abortive. They were mere gestures and served their purpose as portents of what would soon take place.

Melville Lights Home With Gas for First Time in America

One year before Westminster Bridge in London was lighted with gas for the first time, to the consternation of the good Londoners, who expected a most awful catastrophe, in the year 1812, to be exact, David Melville, of Newport, R. I., lighted his home and the street in front with gas that he made

according to a process which he patented the next year. This was the first home in America to be lighted with gas. He is also credited with having induced the Government to use gas at the Beaver Tail Light House.

About half a year before Baltimore established the first gas company, a proposal was made by James McMurtie to the community of Philadelphia to found a gas company. But the inhabitants of the City of Brotherly Love did not take kindly to the idea and rejected it flatly. In fact, so strong was their opposition to gas that as late as 1830 "A Public Remonstrance Against Lighting with Gas" was



Rembrandt Peale

Instrumental in Founding First Gas Company in America

drawn up. This was at the time when the Philadelphians were using candles, lanterns, whale oil lamps and kerosene lamps for lighting their homes, places of business and streets. It was not until 1836 that the Philadelphia Gas Co. was established.

The First Gas Company in America

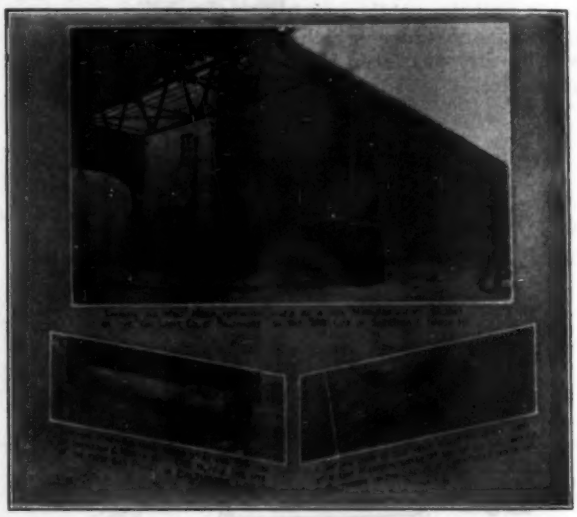
While Newport, R. I., may be said to be the pioneer in gas lighting in America, the first city in the United States to tackle the gas lighting proposition on a really practical scale was Baltimore. Baltimore is a city that is distinguished for the number of first achievements that were perfected within its confines. Thus, for example, in Baltimore was used the first umbrella in the United States: it was the site of the first balloon ascension; calico was first printed in Baltimore; in it was erected the first iron building. The first telegraph line, the first railroad, the first linotype machine, the first electric locomotive were born in Baltimore.

On June 13, 1816, there appeared in the Baltimore newspapers what was a sensational advertisement for that time. It read: "Gas Light Without Oil, Tallow, Wick or Smoke" to be demonstrated in the Museum and Gallery of the Fine Arts in Holliday Street, established by Rembrandt Peale in 1813." This was the advent of gas lighting in Baltimore.

The "American and Commercial Advertiser of Baltimore, December 30, 1815, printed the following advertisement, a clear indication that the people of Baltimore were also somewhat skeptical of what gas could do as an illuminant:

"GAS LIGHTS"

"We learn by the late English papers that Convent Gardens Theater and a number of the streets of London are illuminated by gas light. They are represented as being infinitely more brilliant, more inoxious, and vastly more economical than the common lamp light by oil. One gas burner is equal to twenty common street lamps, and the saving of expense in all cases is very considerable. A shop may be lighted by gas for only 2d. per night. The largest room and even a whole street proportionately cheaper.



"We have been induced to notice this improvement by the curious circumstance that it was first offered by the inventor to the people of Baltimore about eight or ten years ago (1805 or 1807), but the people of Baltimore then laughed at the idea. Now that it has been carried into effect in London, no doubt our citizens will look upon it 'in another light.'

"An American inventor, it would appear, can have little credit in America until he receives the sanction of the people of London, and then he has a chance of becoming fashionable on this side of the Atlantic."

It would appear, therefore, that Baltimore just missed being the pioneer of gas lighting in the world.

The exhibition in Peale's Museum was so successful that on June 17, 1816, the City Council passed an ordinance permitting Peale and others to manufacture gas, lay pipes in the city streets and also to contract with the city for lighting its streets. The Baltimore American of that date tells the story in these words:

The First American Gas Franchise

"A proposition has recently been submitted to the Mayor by Mr. Rembrandt Peale, proprietor of the Baltimore Museum, to light the streets of this city by means of carburetted hydrogen gas; the very brilliant and pleasing light produced by that means the citizens have had an opportunity of witnessing for several nights past in the saloon of paintings at the museum.

Carrying Water to Fill the Wet Meter

"The proposition of Mr. Peale was submitted to the City Council yesterday afternoon at an extra meeting called by the Mayor; and a committee of three members from each branch was appointed to examine the apparatus erected by Mr. Peale for manufacturing the gas, and to make the necessary inquiries as to the manner in which it was contemplated to light the streets of the city.

"We learn with pleasure the committee was so fully satisfied, after a particular investigation, that they will unite in recommending to the City Council to authorize the lighting of the city in the mode proposed. Baltimore will therefore most probably be the first city in the United States that will enjoy the advantage of this valuable discovery, which may be truly called Light of Science."

Then followed this action:

"The City Council held a special session yesterday afternoon, during which they passed an ordinance authorizing the Mayor to contract for lighting the city by means of carburetted hydrogen gas, and an ordinance empowering the Gas Light Company of Baltimore to lay pipes along the streets, squares, lanes and alleys of the city for that purpose was also passed by both branches of the City Council."

The first gas lamp was located at the corner of Baltimore and Holliday streets. The charter members of the gas company, which was incorporated on February 5, 1817, as the Gas Light Company of Baltimore, were Rembrandte Peale, William Lorman, James Mosber, Robert Cary Long and William Gwynn. The first president was William Lorman, a leading merchant and president of the Bank of Baltimore.

The Early Days of the Gas Industry in Baltimore

In the very early days of the Baltimore Gas Works gas was not metered because the meter had not yet been developed. It was first manufactured on a commercial scale in America in 1832 by Samuel Hill. This was in Baltimore. The gas was sold on the basis of estimated consumption in different type burners—for example, the 12, 14 and 18 dollar burners of the Argand style and also fan burners. Meters were first imported from England.

Gas was first made from coal and a supply of wood was held in reserve in case the coal pile became depleted. Rosin was also used in the gas-making

How the Early Meter Setter Looked

process. The consumption was about 60,000 to 80,000 cubic feet daily. The holders for storing gas

were located inside the building and the tanks containing the holders were built of wooden staves held together with heavy iron hoops.

A One-Time Landmark

A new works was erected in 1847 and a 275,000 cubic foot holder was built. This was a landmark for a long time. In later years other gas companies were formed in the city and eventually all the companies were consolidated with one operating unit, which is known as The Consolidated Gas, Electric Light and Power Company, and which today supplies the city of Baltimore and environs with gas.

Before leaving Baltimore and the part it played in the history of the American gas industry it must be pointed out that the gas industry in that city also has the distinction of being one of the first to adopt the Lowe water gas process and at the time of its first introduction into Baltimore in 1878 the Consumers Mutual Gas Light Company of Baltimore was the largest water gas manufacturer in the country.

Further Developments in American Gas History

After Baltimore had established the first gas company and had achieved success, it would have seemed that the further development and the spread of gas in the United States would have been rapid. But it was not so! People were frankly afraid of gas. The New World was scarcely any different in this respect than the Old World. All sorts of objections were raised against it and all kinds of superstitious ideas were prevalent about this new product, this "smoke" derived from coal.

People were afraid to touch the pipes through which it was distributed for fear that they would burn their hands. Wherever adventurous (mark the word!) spirits proposed a plan for gas lighting, immediate opposition would arise and arguments of the most varied sorts were enlisted against it.

A Deluge of Opposition Against Gas

It is both remarkable, humorous and at the same time actually sad to read of the objections that were raised against gas by the various communities in New England and elsewhere who stubbornly persisted in using smelly candles, oil lamps and lanterns, which gave poor light and were considerable trouble. It may be likened in a way to the obstacles that gas has been gradually overcoming these days in its battle as an industrial fuel.

Thus, the use of gas was characterized as ungodly, a direct attempt to go contrary to the teachings of the Divine Being and to interfere with the Divine Plan that made day and night a pre-ordained separation of the twenty-four-hour period. Night was made to be dark, was the contention.

It was said that gas lighting of streets would tend to make people ill, for then they could and would walk about the streets at night and be apt to catch colds. It was pointed out that lighting the streets with gas was a sure sign of moral depravity, for would not drunkenness and evil of all kinds increase? No longer would fear of darkness prevail and curb the evil tendencies in mankind!

Today we hold that lighted streets decrease crime and have proven statistics to substantiate this belief. In the early days of the industry it was argued that thieves and criminals would be emboldened by the brilliantly lighted streets! How marvellous sometimes are the workings of the human mind! Furthermore, would not horses be frightened and the people themselves would not really want such bright illumination, for then what use would there be in holidays, when brilliant street lighting would be a common, every-day occurrence! These and other similar contentions were devised by the active minds of the day to prove that gas was undesirable.

They Are of No Avail

But, in spite of all objections and all the obstacles that were thrown into its way, the use of gas spread. The old forms of lighting and eventually of heating were gradually abandoned and gas was substituted in their place. Companies sprung up in different cities, both in America and abroad, and simultaneously therewith improvements in gas manufacture, distribution and use were made.

The Old Bowery Theater, First Theater to Be Lighted with Gas

However, before describing these, it will be well to review gas progress in a few other important cities where gas entered the lighting field fairly early in its history in the United States.

The Gas Industry in Boston

Boston was the second city in the United States to use gas for lighting in a practical way. It is in-

teresting that this event took place in the same year, 1822, that Boston abandoned its town meeting and first became chartered as a city. It is to the credit of the Bostonians that they were not found among the skeptical and the inimical to gas in the early days of its American history, but were actually admirers of gas lighting and took to it kindly.

One of the earliest, if not the first, mention of gas in Boston, is found in the Boston Daily Advertiser. The item was as follows:

"Several attempts have been heretofore made to introduce gas lights into this town without success. We are not acquainted with the causes of the failure. An experiment has lately been made with better promise. A company formed for the purpose of furnishing the gas has succeeded in obtaining that

which burns entirely free from smell or smoke, and they offer to furnish it for general use on such terms as will make it the cheapest as well as the most perfect artificial light. They have made a very satisfactory experiment at the shop of Mr. Bacon in Court street, the splendid appearance of which has nightly attracted much attention. We understand that preparations are making for introducing it into extensive use."

First Gas Works in Drug Store

The first gas works in the city were located in a drug store. The original petition for permission to lay pipes in the city streets for distributing gas was made by an "Association" known as the "City Gas Company." In the following year (1823), after the aforementioned petition had been allowed, and due to the failure of the original company successfully to make and market gas made from oil, a state charter was granted to William Prescott and others to make and sell gas in the name of the Boston Gas Light Company. This company was subsequently incorporated as the Boston Consolidated Gas Company, and has continued in the gas business ever since its inception, the first gas company in New England and the second in the history of gas in the United States.

Gas First Sold in 1828

But no real progress was made in the commercial sale of gas in Boston until 1828. In that year the first gas planted was erected and on the first day of January, 1829, a day which was set aside for public jubilation, street lamps were lighted with gas. This gas was made from coal, oil being abandoned as a gas-making fuel.

In 1837 it is recorded that the largest gas holder in the country, having a capacity of 15,000 cubic feet, was erected in the city. From 15,000 cubic feet to 15,000,000! What a tremendous advance in holder construction!

Boston Gas and Harvard College

The early history of gas in Boston is closely connected with Harvard College and its affairs. The president of the gas company from 1849 to 1861 was Samuel A. Eliot, erstwhile Mayor of Boston, treasurer of Harvard College, and the father of Charles W. Eliot, long president of the college, now retired and known the world over as one of the leading educators of his day.

In a recent address, Dr. Eliot told how he first introduced gas into Harvard. His story follows in his own words:

Dr. Eliot's Story

"I remember perfectly the charcoal cart," said Dr. Eliot, in describing the Cambridge of 1849. "There was no gas, of course, in those days. The careful housekeeper or householder awaited the advent of the charcoal cart, which announced itself by a loud shout from the driver of 'Chuck-coal.' Now we just turn a cock in a gas stove and we have a quick fire in two seconds.

"The advent of gas light made a great difference in Harvard Square. It made some difference in the college buildings after a time. When I was a student, the ordinary mode of securing light in a stu-

dent's room was to burn a very volatile and inflammable liquid called camphine in a glass lamp. That camphine was sold at Wood & Hall's without the least regard to its highly explosive quality. But that camphine lamp lasted as the common student lamp down to the year 1836, when I was the means of introducing gas into the college buildings. It happened in this way:

"Dr. Estes Howe, president of the gas company, conceived it would be a good thing for the company to get the gas into all the college buildings. He saw a good row of customers there. He applied for liberty to put the gas pipes into all the college buildings, the college to pay for the pipes and the company to furnish the meters—a meter in every room, of course. This offer was absolutely rejected on the spot by the Corporation of the college, who regarded this innovation as an extremely dangerous one. I was living at the time in Holworthy Hall, middle entry, a tutor; and Dr. James Walker, the then president of the college, told me one evening, when I was taking tea with him—he was good enough to invite me to take tea with him every Friday evening—what a ridiculous proposition the Cambridge Gas Company, through Dr. Howe, had made for the introduction of gas into the college buildings; nothing could be more absurd.

"Well, it did not look so absurd to me at the time; the fact was, I wanted a gas light in my own room in Holworthy Hall. Finally I asked Dr. Walker if he would be willing to have me consult Dr. Howe on the proposition that the gas company should put pipes and meters into one college building, namely Holworthy Hall, and that the gas company should pay for the pipes as well as the meters. The president rashly consented to have me propound that proposal. I went to Dr. Howe and represented to him that if gas proved as safe as camphine in one college hall, it would soon be demanded in all. After a little hesitation, he said the company would do it; and those pipes in Holworthy Hall still belong to the Cambridge Gas Company. I doubt if they know it.

"The introduction of gas made a very great difference in the shops in Harvard Square. Before gas came in, you really could not see to buy anything in the Cambridge shops after the sun went down; yet the evening trade was important for them. Gas light lasted long in the shops on Harvard Square. What a considerable difference it made to the shops, those successive changes from oil lamps and candles to gas, and then from gas to electricity!"

An Old Type of Gas Street Lamp
(Inset—An Old Oil Lamp)

Gas in New York City

The next city to use gas for lighting in a commercial way was New York. In 1823 a charter was granted to the first gas company to be established in New York, which was known as the New York Gas Light Company. The first office of the gas company was in a building which was originally used a a Quaker church. This building was for many years employed as a branch office of the Consolidated Gas Company, the successor of the old gas companies in the city.

Retort House in Old Manhattan Gas Works

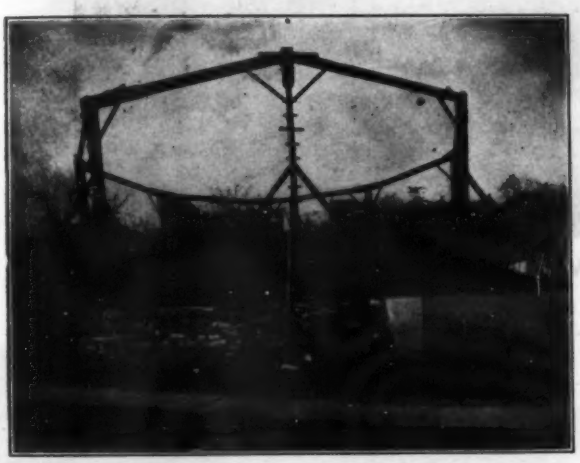
The first president of the company was Samuel Leggett, a Quaker, who was one of the first in the United States to illuminate his house with gas. The capital of the original company was $200,000 and by July, 1824, there were six miles of mains, supplying the brisk demand for the new illuminant at a rate of $10 a thousand cubic feet.

It is a most interesting fact that the original fire, that was started in the first gas works in New York, has been carefully preserved, a mass of live coals being transported from plant to plant and it finally being used to start the great plant located in Astoria, Long Island, which today supplies a large portion of Greater New York with gas.

While the charter of the first gas company in New York bears the date May 12, 1823, it was not until March, 1825, that gas came into actual use in the city.

The ceremonies attendant upon the lighting of the first gas light were much of the same nature as those in Baltimore and Boston, and the New Yorkers were just as skeptical as most others as to what would eventually come out of this new illuminant. The Mayor of the city was imbued with caution and a praiseworthy intent to protect the lives and property of the citizens and so had the police and firemen ready for an emergency. The anticlimactic effect of the jet of gas burning quietly and orderly must have been overwhelming. It was demonstrated that gas would burn without danger and would give a fine light. Further progress in the spread of gas lighting in the city was then rapid.

An interesting event in gas and used as theatrical history was William Niblo's starting what is world-famous today as the Great White Way. In 1828 he used gas to illuminate the letters of his name, displayed in front of his theater at Broadway and Price street. This was the first use of gas in illuminating



Central Gas Light Co. Holder, Mott Haven, N. Y., in 1860

a theater and proved to be the talk of the town for many a day.

Spread of Gas Lighting in the U. S.

The fourth city in the United States to use gas for lighting was New Orleans. This was in 1833 and three years later, in 1836, Philadelphia and Pittsburgh first adopted gas for illumination. The story of gas in Philadelphia is told in the following words:

The Philadelphia Gas Works

"The Council of the City of Philadelphia, in January, 1834, passed an ordinance to build a gas works to supply the city. The following year Samuel Vaughn Merrick, a well-known engineer of the time, was commissioned by the City Council to visit Europe for the purpose of making a study of gas plants and operating methods. In 1835 construction was begun on the Philadelphia Gas Works under Mr. Merrick's supervision. This works was located on Market street at the Schuylkill River. On February 8, 1836, gas was turned into the city mains.

"Mr. Merrick remained as engineer of the gas works until 1837, when he resigned to look after his many business interests.

"As the city of Philadelphia extended westward, the old Market street plant finally became hemmed in practically the center of the city, and gradually became inadequate to meet the demands on it. In 1851 the city acquired a tract of land adjoining it to the south, known as Point Breeze, and a coal gas plant was built on this tract.

"Surrounding Philadelphia were a number of small towns and villages, in several of which small coal gas plants had been built sometime in the forties. In 1854 these suburban towns and villages were consolidated with the city of Philadelphia. The small gas plants soon were abandoned, and several of them became outlying holder stations of the Philadelphia Gas Works.

No. 7 Cherry Street, First New York House to Be Lighted with Gas

"In 1875 an additional large coal gas plant was erected by the city on the Delaware River in the northeast section of the city in the district known as Port Richmond. In 1889 the first water gas plant in Philadelphia was erected at the Port Richmond works.

"The Philadelphia Gas Works on December 1, 1897, was leased for a term of thirty years to The United Gas Improvement Company and the city gas works is being operated under that lease.

"In 1898 a large water gas installation was made

at the Point Breeze works, and since that time the city has been supplied with a mixture of coal and carburetted water gas.

"At the time the lease became effective (1897) the maximum daily sendout of gas in Philadelphia was 19,770 M. In January, 1924, a maximum day of 77,714 M. occurred.

"The United Gas Improvement Company of Philadelphia was organized in 1882, as a holding company."

Cincinnati adopted gas lighting in 1840 and in the same year Montreal inaugurated the gas industry of Canada. St. Louis followed in 1846, Fall River, Mass., in 1847, and in 1848 six cities first used gas for lighting, namely, New Haven, Conn., Paterson, N. J., Providence, R. I., Rochester, N. Y., Washington, D. C., and Buffalo, N. Y.

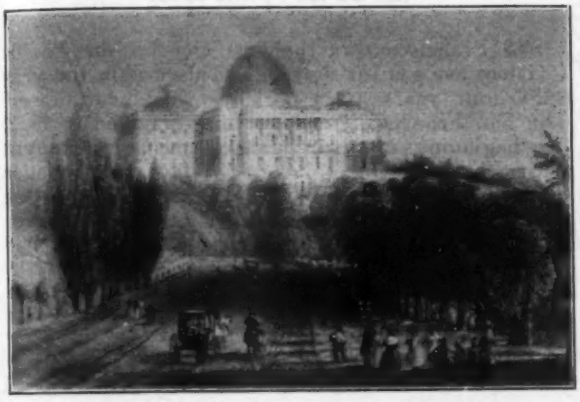
The Largest Gas Works in the World, at Astoria, New York City

Carting Out the Coke in the Old Way

The Old Method of Discharging the Retorts

The Washington Gas Light Company, which was organized in 1848, has the distinction of being the only gas company, with the exception of its subsidiary, The Georgetown Gas Light Company, that was given authority by Congressional legislation.

The first gas was made from rosin entirely. The



The Capitol Building in 1837

success of the new illuminant immediately led to the proposal to use it for lighting the Capitol and the "President's House." It is said that the dripping of candle grease on the coat-tails and gowns of guests at official entertainments in the new White House hastened the introduction of gas illumination.

very attainment, but is a fact, and simply affords an idea of what is meant by the gas service as is given by the American Gas Industry.

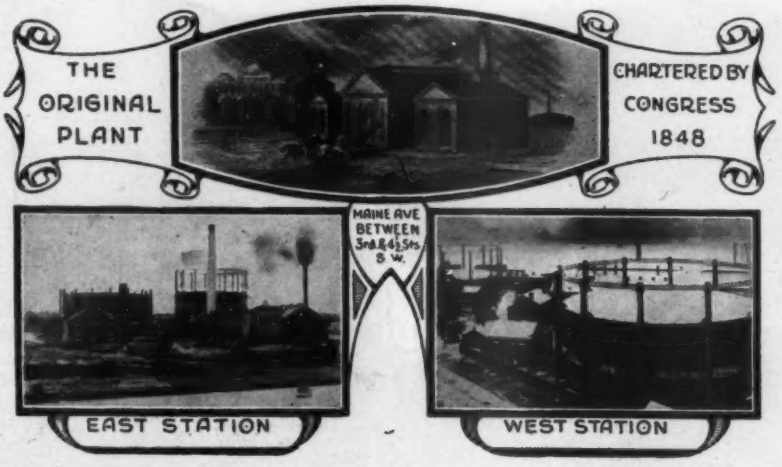
Norfolk, Va., Cleveland, Ohio, Detroit, Mich., Syracuse, N. Y., and Utica, N. Y., all adopted gas lighting in 1849, and in 1850 Chicago, Ill., Columbus, Ohio, Hartford, Conn., Worcester, Mass., and Kingston, N. Y., did likewise.

Gas in Chicago

The early story of gas in Chicago is found in Kirkland's History of Chicago, as follows:

Dumping the Hot Coke

"Among the elements essential to the health and comfort of inhabitants of any city are light and pure



The original company started in a small way, but grew rapidly and it was not long before gas making from rosin was abandoned and gas was manufactured from gas coal. The Washington Gas Company has a splendid record for continuous service, a record which is to be found in most any gas company in the country. This is not in disparagement of this

water, the former of which has been more easily obtainable than the latter, although Lake Michigan washes the shores of the city.

"In 1849 an act was passed by the Legislature authorizing the formation of the Chicago Gas Light & Coke Company.

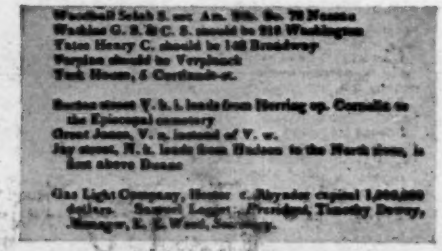
"The work of laying mains and constructing the

necessary buildings was completed in 1850 and the city was lighted with gas in September in that year.

"This event formed an epoch in Chicago's history. The filling of the pipes with the lighting fluid and the bursting forth of the brilliant flames when a match was applied, illuminating with a new and beautiful light stores and streets and buildings, were watched with intense interest and delight by an admiring crowd of citizens.

"The works were situated on the south side of Monroe street, near Market.

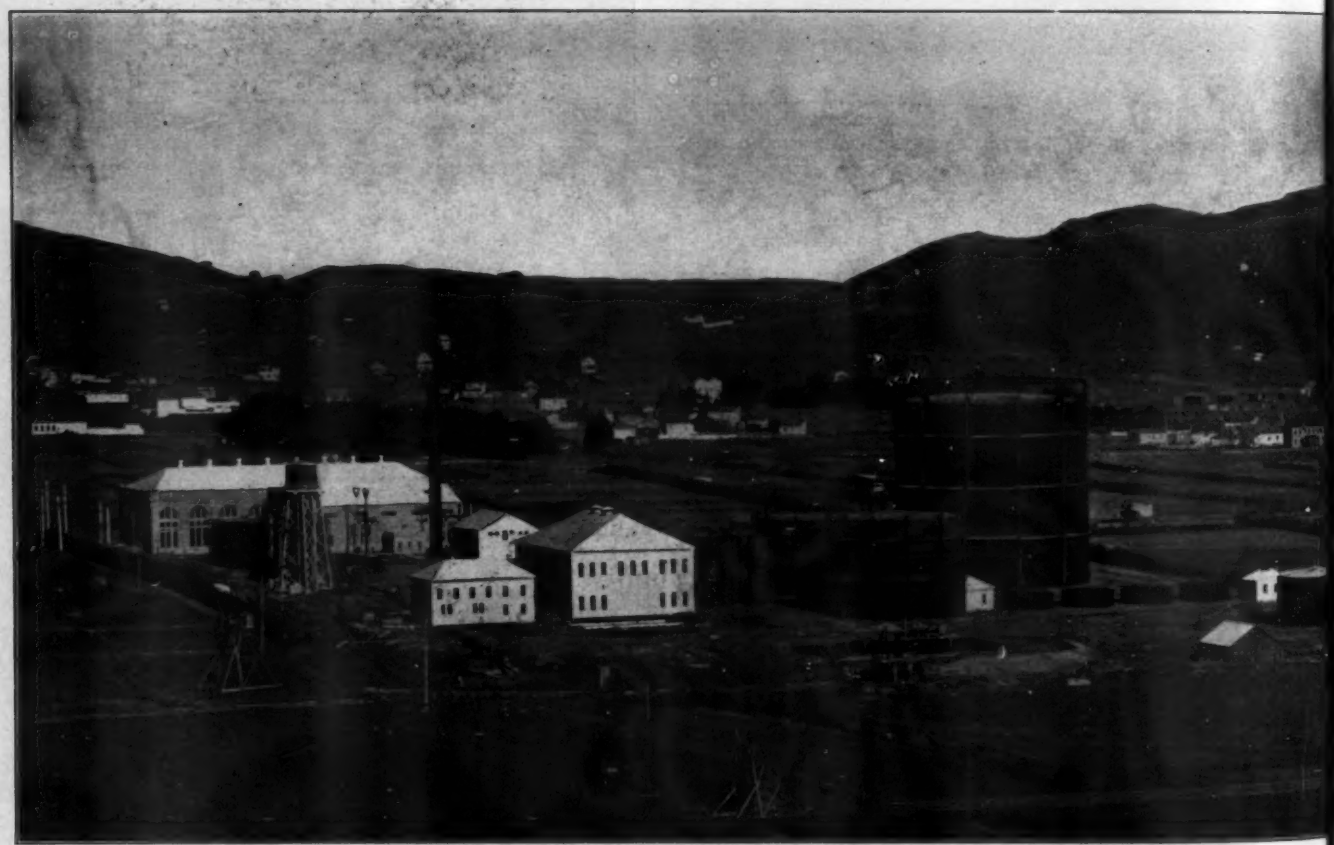
"The cost of lighting the city lamps was fixed at $15 a post. By 1855 nearly 78 miles of service pipe had been laid and there were almost 2,000 consumers of gas."



The Gas Co. Makes First Appearance in N. Y. City Directory in 1824

Gas On the Pacific Coast

San Francisco was the first city on the Pacific Coast to use gas for lighting. This was in the year 1854, four years after the city was incorporated. The San Francisco Gas Co. was organized in 1852. The beginnings of gas in San Francisco were fraught with great difficulties, due to the fact that supplies had to be transported from the Atlantic Coast. Gas was first made from coal, which was brought over from Australia. In 1855, when the company had twelve miles of gas mains, the price of gas was $15 a thousand cubic feet. After the gas industry in



General View of Martin Station at Visitacion Valley Near San Francisco. The First Large Producer of Oil Gas in the World

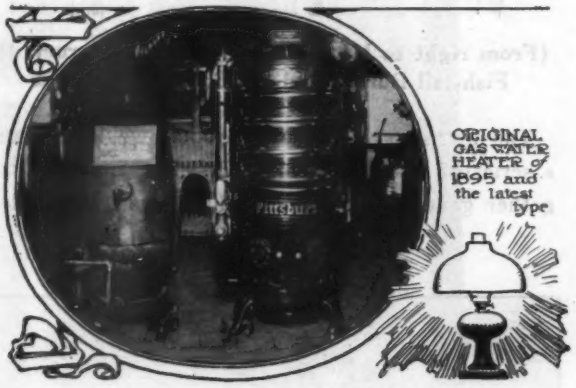
San Francisco was fairly started, it developed very rapidly, both in that city and in others on the Pacific Coast. Portland, Oregon, adopted gas lighting in 1860, Los Angeles, Cal., and Oakland, Cal., in 1867, Seattle, Wash., in 1873, Tacoma, Wash., in 1885, and Spokane, Wash., in 1887.

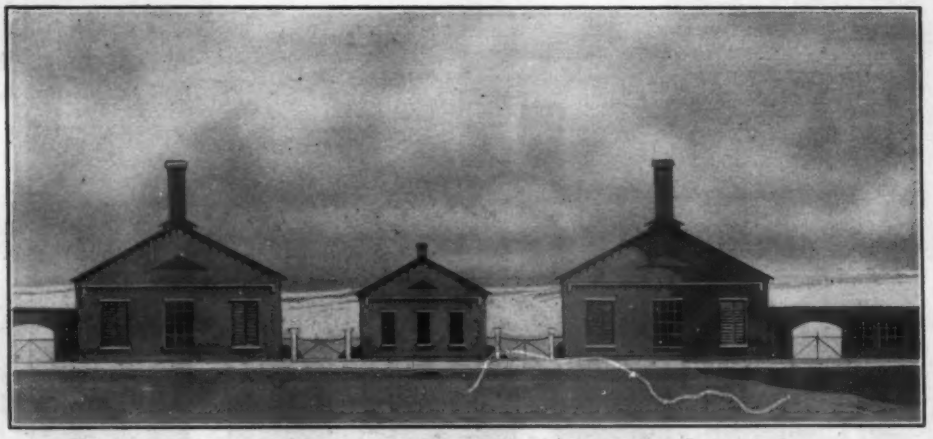
The Gas Industry in Canada

The first place in Canada to use gas was Montreal, in 1840. In 1841 gas was first supplied in Toronto.

An Old View of Toronto

Halifax came next in 1843, Quebec in 1849, Kingston in 1850, Hamilton in 1851, and Brockville in 1853. The Consumers Gas Company, which supplies Toronto with gas at the present time, was incorporated in 1847.





View of Toronto Gas Works in 1855

Thus gas was established and developed both in the New World as well as in the Old World. Its use for illumination became universal and remained so until the advent of a lighting medium superior from certain standpoints and possessed of enough popular advantages to make it appeal to the public. There is no question but that electricity possesses certain advantages over gas as a lighting medium, but then, again, gas is a better and more reliable lighting medium in certain other respects. The ideal system is a double gas and electric lighting system, in which electricity is the principal light medium, with gas as the auxiliary medium, to be used when electricity fails. And fail it does at times, while gas has never been known to fail, except under most extraordinary conditions—fire, tempests, earthquakes, etc. Such a dual system would be admirable for street lighting, particularly where the electric company is not equipped with protective devices against lightning.

Gas for Heating

But, after all, the really important use for gas is in heating. The use of heat for cooking has been traced from the earliest times, when food was eaten raw, to the coal stove. The gas range was the next development and it remains today the premier cooking agent.

Winsor was far-sighted enough to see the possibility of using gas for cooking at a time that it was not believed to be suitable even for lighting. The development of the gas burner itself had, of course, considerable to do with its use, both as a lighting and cooking medium.

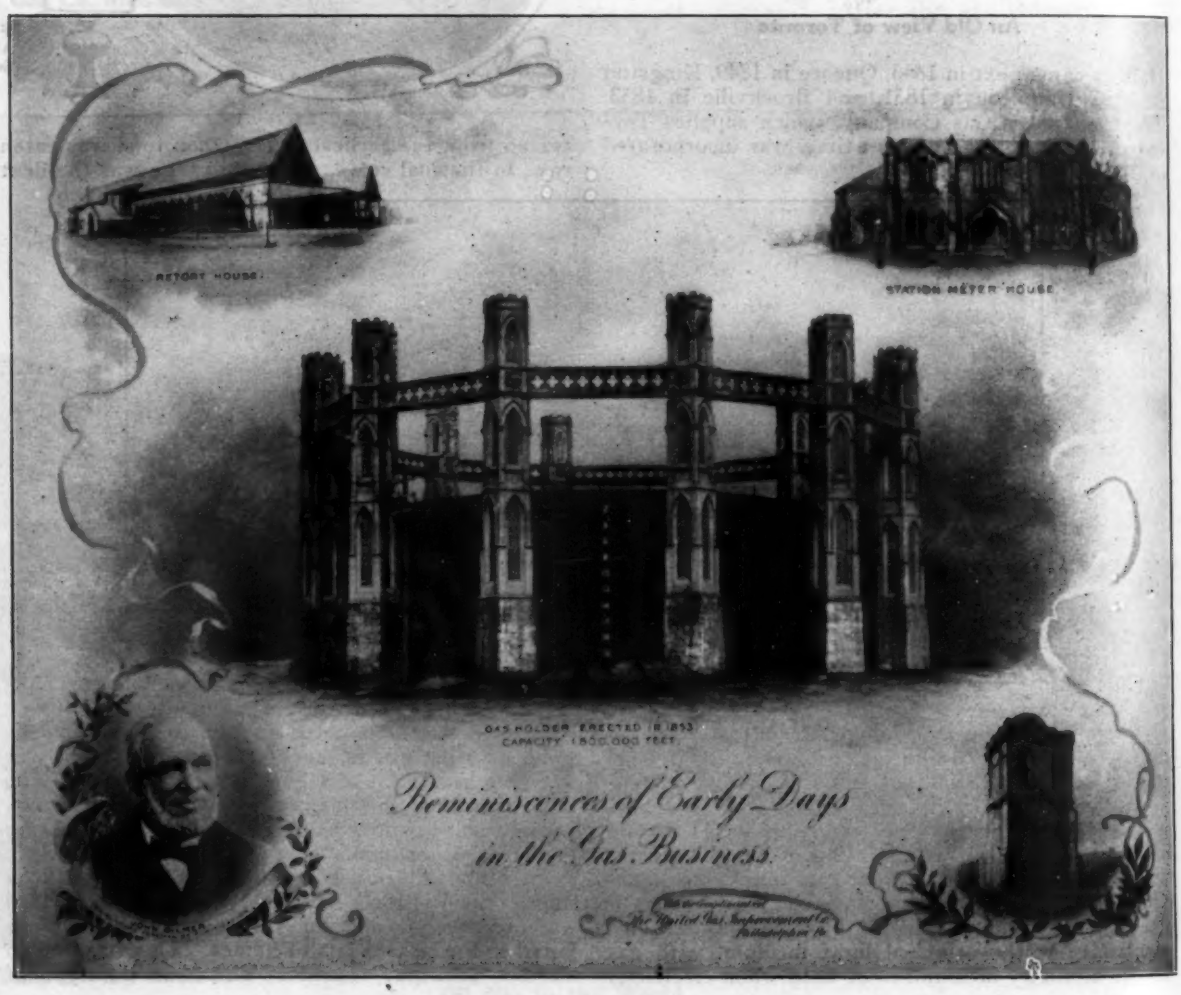
In 1779 Murdock used the open end of a small iron tube as the first form of gas burner. Then he welded together the opening and three small holes were bored to for mthree jets of flames. This was known as the "cockspur" burner. This was the type of

burner used by Murdock to light the Phillips and Leeds works in Manchester in 1807.

(From right to left): The Cocks-comb Burner, the Fish-tail Burner and the Bats-wing Burner

The next step was to flatten out the welded end and a series of small holes made in a line and close together gave jets of flame. This burner was called the "cocks-comb" burner. The "bats-wing" burner was made by replacing the line of holes by a sawcut.

In 1820 Neilson invented the fish-tail burner, and in 1853 the regenerative burner was developed, in which the heat of the flame was used to preheat the air supply. The incandescent light was developed in 1826 by allowing a cylinder of lime to become incandescent in an oxyhydrogen flame. In 1855 Bunsen invented the Bunsen burner, in which air is mixed with gas to give a mixture which will burn completely and yield considerably more heat than the luminous flame. In 1886 Auer von Welsback used this hot blue flame to give a brilliant light by means of the gas mantle. Since then further developments have been made in the design of gas burners which have made possible the attainment of even better results with gas both as a heating and lighting medium.



Old Views of Philadelphia Gas Works

First Mention of Gas Cooking

The first mention of gas cooking is found in a British journal in 1823, as follows:

"A small oven having a circle of gas flames with a reflecting cone, enclosed in a cylinder of tin, from the top of which a pipe carried off the burnt air. Nay, it will almost appear incredible to assert that the same table, desk or sideboard which furnishes a light or flame will serve to warm my room, and even dress my victuals in case of need; and by the mere turning of a cock, or the corking or uncorking of a small pipe or tube."

It is, however, believed that Dr. Clayton in 1739 boiled eggs by a gas flame. In 1792 Murdock cooked chops and steaks over gas jets. In 1830 or 1832 James Sharp, an Englishman, used gas for cooking in his own home, and in 1850 Soyer, a French chef of great reputation in his time, used 216 jets to roast a joint of meat weighing 535 pounds.

It is interesting that the American Gas Light Journal, which is now the American Gas Journal, in its first issue of July 1, 1859, carried two advertisements of gas stoves and cooking apparatus.

First Gas Appliance Store in America

The first distinctive gas appliance store is said to have been opened by the gas company in Providence, R. I., in 1873. In the Centennial Exhibition in Philadelphia, in 1876, a baking powder company demonstrated the baking of cakes on gas stoves. A description of the manner in which the old gas stoves were constructed follows:

A View of the Modern Toronto Gas Works

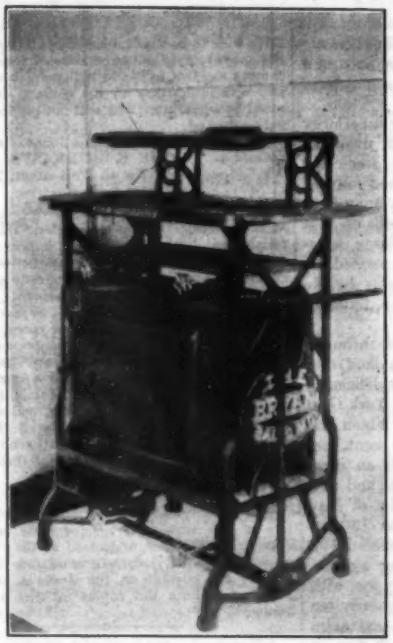
The Charging Machine

"The stove was made in Philadelphia. The top burners were made of coiled half-inch pipe drilled and had, of course, a burner mixer. It burned 6-8 cu. ft. per hour. The oven was made air tight and was heated externally, as are wood and coal ranges. The oven was heated from below by means of a burner made by drilling holes in a half-inch pipe that extended across the front of the stove below the oven. There was no burner mixer on this burner, as it gave a yellow or illuminating flame, which was used for roasting. Every one said it was alright, but it would use a lot of gas."

The use of gas for cooking did not, however, become popular in any sense of the word until 1895. By that time real efforts had been made to popularize the gas range and since then the development has been very marked.

Other Gas Appliances

Space is wanting to give the interesting story of the development of the other gas appliances. Robert Hicks in 1825 burned spirits of turpentine and carburetted hydrogen gas for heating water. The bath tub was invented by Lord John Russell in 1830. It was long before bath tubs were enthusiastically used in Europe and America. The development of the water heater in the United States was slow until natural gas was discovered. The first instantaneous



An Early Form of Gas Stove

automatic water heater was patented in England in 1885 and in the same year one appeared in the United States. Further development in water heaters was then rapid. Today one of the real pleasures of modern civilization is the gas water heater which makes it possible to secure hot water within a few minutes.

Bread toasters, gas furnaces in miniature, hatters' irons, laundry stoves, bathroom stoves, gas ovens were advertised in 1859. In 1870 gas was applied to generate steam. Gas was suggested for heating bakers' ovens in 1885. In 1915 gas was first used in refrigeration. Today the number of gas appliances, used for both domestic and industrial purposes, is very large, and it is increasing year by year as gas enters new industrial fields.

The Technical Field

Just a word must be said about the technical developments in the gas industry. The work of Murdock, Clegg, Melville, has been described. Taylor and Mattmeau invented the oil gas process in 1820. In 1830, Clegg patented a dry meter. In 1835 gas meters were manufactured in New York. Many other improvements in meter construction followed, culminating in the wonderfully accurate instrument in common use today. In 1873-4 Lowe invented the water gas apparatus.

Within recent years important progress has been made in the technology of gas. The development of the vertical retort, the advent of low temperature carbonization and complete gasification, the use of bituminous coal in water gas manufacture, the use of oxygen in gas making, and various other technical improvements, are evidences of the great activity of gas technologists to improve the gas-making process.

Gas Associations

The story of the American Gas Industry would be incomplete without mention of the trade associations that were formed by gas men for their mutual benefit

An Early Form of Gas Heater

and aggrandisement. The American Gas Light Association was established in 1873. In 1906 it was consolidated with a number of other state associations to form the American Gas Institute, which lasted until 1918, when it was combined with the National Commercial Gas Association, established likewise in 1906, to form the American Gas Association, whose sixth annual convention is now being held in Atlantic City.

THE

AMERICAN GAS-LIGHT JOURNAL.

JOHN B. MURRAY & CO., BANKERS, NO. 40 WALL STREET, NEW YORK CITY,

PROPRIETORS.

No. 1. NEW YORK, FRIDAY, JULY 1, 1859. $3 PER ANNUM. PUBLISHED MONTHLY.

OUR FIRST NUMBER.

Of this, our first number, we issue ten thousand copies, which will be forwarded to subscribers and otherwise distributed in all the cities and towns of the Union, among Gas-Light and Water Companies, their Shareholders and Contractors, and among Banks, Bankers, Merchants, Manufacturers, and owners of Real Estate.

Our sheet was intended originally, and, indeed, prepared to be set up, as a private circular—a mere Price Current of the Gas Light Shares of a few of the principal cities—for gratuitous distribution, monthly, to our own correspondents and dealers; but while in the course of preparation, in the early part of June, we were solicited to enlarge the sphere of our plans, by embracing all the American companies, together with such details as would enable parties interested to compare notes, and avail themselves of every means of improvement, economy, and profit. We acceded to this request, and a sheet of four pages was soon ready to be issued. Others then expressed a desire to adopt this medium of advertising their business to companies and individuals engaged in the manufacture and consumption of gas, as being more direct than any now existing.

Yielding to all these suggestions, we present THE AMERICAN GAS-LIGHT JOURNAL, as the first paper, however small and inconsiderable, ever published in this country, identified with that important interest, the magnitude of which is illustrated by the footings of our tables, showing 183 Companies to represent an aggregate capital of thirty-one million six hundred and sixty-one thousand five hundred and seventy dollars, while we have not more, perhaps, than two-thirds of all the Companies yet registered. We hope, however, to secure a complete List before our second number goes to press, when we think the grand aggregate will foot up four hundred Gas-Light Companies, representing a gross Capital of fifty, perhaps fifty-five, millions of dollars!

That so large and diffusely scattered an interest should have been left till this day unrepresented by a paper of its own, is indeed surprising in this protective age, and it was our only ambition in assuming the labor and responsibility of it, to place before our friends and correspondents, in an authentic form, a sound and reliable security for the investment of their funds, which have been left hitherto measurably to our own discretion. They have now the means of judging for themselves. We did not expect to profit by the JOURNAL otherwise than indirectly, as an auxiliary to our regular banking and brokerage business; but we have the pleasure to state that, so fully has it met the approval of those to whom the prospectus has been submitted, it goes forth at its first number a SELF-SUSTAINING PAPER—an unusual case, we believe, for a new publication on a comparatively unconsidered subject.

We have been long satisfied of the superiority of Gas-light shares as an investment, over any other corporate security, especially since the crisis of 1857, which, while it crushed railroad and many other securities completely, may have tended to diminish, for the few months of that winter, the consumption of gas in large warehouses and manufactories; but it operated, on the other hand, to augment its profits by the depreciation in the cost of coal, iron, building material and labor.

The impetus given now to commerce throughout the length and breadth of the land, has more than equalized the temporary deficiency alluded to. Instance the old New York Gas-light Co., the pioneer on this island, which has steadily paid its eight and ten per cent. per annum for many a long year, with an occasional EXTRA DIVIDEND of ten per cent., and now one of TWENTY PER CENT. on the 1st of May last; whose stock has ruled as high as 150 per cent. for months, and for which we offered 175 since the first of June, without finding a seller.

The Manhattan Gas-light Company too, with its capital of four millions, divides regularly ten per cent. per annum, with an occasional extra dividend of ten per cent., and its stock firm at 150; and all this with the price of gas reduced to two dollars and a half per 1,000 cubic feet.

A reference to our Tables will show that the majority of other companies throughout the country pay from 8 to 10 per cent. per annum. Witness the Albany, Auburn, Baltimore, Boston, Bridgeport, Buffalo, Cincinnati, Hartford, Milwaukie, Ottawa, Pittsburgh, Raleigh, Roxbury, Troy, Washington and Wilmington companies—all above par, with the July dividend paid, and that dividend a very liberal one. Other companies, however, have felt very sensibly the diminished consumption, and their shares are depreciated correspondingly; but the returns from all speak now quite cheeringly of their prospects, and investments in some of these depreciated shares will pay large and certain profits. We shall take up hereafter the entire List alphabetically, and give full particulars of each company as soon as our complete organization will permit. We are arranging with a gentleman of scientific attainments, practically conversant with the business, to conduct the editorial part of the JOURNAL, our own occupations being quite foreign to that department, although identified with the subject as dealers in the securities it represents.

TO CORRESPONDENTS.

We wish to be kept informed of all improvements in the manufacture and circulation of Gas, and of machinery incident to it, and will publish with pleasure any communications on the subject, duly authenticated by signature. We will not publish signatures unless desired.

All communications for this JOURNAL should be addressed to JOHN B. MURRAY & CO.,
No. 40 Wall street, New York.

TO ADVERTISERS.

Advertisements—especially those relating to materials used in the manufacture, improvement or distribution of gas, or in the construction of works—should be sent in at once, in order to appear in our second number. Yearly advertisements, $25 to $100, according to the space occupied. SPECIAL ADVERTISEMENTS double these rates. In all cases, the JOURNAL will be served gratis during the continuance of the advertisement. Advertisements of Gas-Fitters, Plumbers and Gas-Fixtures, will be arranged in separate columns for Albany, Buffalo, St. Louis, Mobile, Philadelphia, Boston, Baltimore, New Orleans, and other places. The circulation of the JOURNAL, in all the cities and towns where gas-light is used, will render it a desirable medium for local advertising of that description.

TO POST-MASTERS.

Post-Masters and others who remit us Twenty dollars at one time, will receive *eight copies* of the JOURNAL for one year, addressed as they may direct; or for Ten dollars we will send *four copies*. We pre-pay the postage on the JOURNAL in all cases. Please distribute the copies of this number sent herewith.

ADVERTISING is the lever with which, resting on Enterprise as the fulcrum, Commerce moves the world.

TO GAS AND WATER CONSUMERS.

We have had enquiries from several quarters whether our columns will be open to communications and suggestions to, the gas and water companies from consumers and others. Undoubtedly they will. The very object of the JOURNAL is to be a medium of communication between the companies and between the companies and consumers.

MARRIED.

At Hudson, N. Y., on 2d June by the Rev. Henry Darling, of Philadelphia, CHARLES ROOKE, Esq., President of the Manhattan Gas-Light Company, to MARY M. WELLS, daughter of Richard I. Wells, Esq., of the former place.

OFFICIAL.

New York State Inspector of Gas Meters.
OFFICE No. 561 BROADWAY.

The whole number of Gas Meters proved since the new law took effect, 4th May, 1859, is..... 4,620
Daily number proved, about..... 125
Number of proving apparatus used..... 17
Time required in proving, from 10 minutes to 1 hour each.

The meters found incorrect have been about 4 per cent. Nearly all new meters are Rotary or Slide Valve Dry Meters.

The Patent Eccentric Valve will eventually supersede all other kinds.

NEW YORK, June 30, 1859.

GEORGE H. KITCHEN,
State Inspector.

The First Page of the First Issue of the American Gas Journal

The work of the associations is too well known to need explanation here. Suffice it to say that they have been splendid examples of the best there is in trade associations. They have been a great aid and a real inspiration to the entire gas industry and to the individual gas men that constitute it.

Before leaving this matter of trade associations, mention must be made of the Public Utility Information Committees, which were first started four years ago. These organizations, which exist for the benefit of all utilities, not only gas, have done splendid work in keeping before the public the case of the public utility. They have done much to improve the position of the public utility in this country and are active agents in the promotion of good will towards the public service industries among the communities which they serve.

The First Gas Paper, The American Gas Journal

It is with a feeling of rightful pride that the American Gas Journal claims sixty-five years of continuous service to the American Gas Industry. The American Gas Journal, which was founded on July 1, 1859, under the name of the American Gas Light Journal, is the oldest trade paper in the gas field and one of the oldest in the country.

The paper was established by John B. Murray & Co., bankers, at No. 40 Wall street, New York City, and was first intended for private circulation as a mere price list of gas company securities. But the owners were encouraged to make a real trade paper of it covering the entire American Gas Industry. This they did with the very first issue!

It is interesting to note that even in that issue on the very first page editorial comment was made on the superiority of gas company shares over all other corporate securities.

At first The Journal did not have an official editor. J. B. Murray, Dr. John Torrey, assayer of the United States Mint, and Prof. Henry Wurtz divided the editorial work between them. On July 2, 1860, The Journal became a semi-monthly. The first issue of December of that year contained a notice to the effect that Mr. C. Elton Buck was to be the editor of the paper.

On July 1, 1864, John B. Murray's connection with The Journal ceased, the name of The Journal being changed to The American Gas Light Journal and Mining Reporter. The editor and proprietor was James W. Bryant. A little later Dr. Charles W. Torrey was added to the editorial staff and in the early part of 1866 Mills L. Callender became the editor of the paper. Mr. Callender afterwards became publisher of The Journal, whose editorial tone was entirely changed, it devoting its columns entirely to gas.

The paper flourished under this management. In 1870, Charles E. Sanderson became connected with the paper and afterwards in 1881 became its manager. Prof. Wurtz and Major George Warren Dresser were its editors during this time. Colonel Joseph R. Thomas became the editor in 1883 and in 1898 the editorial management of the paper was undertaken by Thomas J. Cunningham and Elbert P. Callender.

In March, 1920, the name of The Journal was changed to The American Gas Journal.

The Future of Gas

This, then, is the story of gas! In earliest times associated with the mystical powers that were supposed to rule men and direct their ways, the gods and goddesses for whom the Greeks and Romans built a veritable world of their own, then played with by men of more or less scientific bent, but viewed with some doubt even by them and unhesitatingly designated by the ignorant as a tool of Satan and his nether-world underlings, experimented with in a practical manner for the first time by Murdock and made into a commercial fact by the genius, the courage and the untiring patience of Winsor and his associates, gas developed, entered new fields, suffered defeats, spread all over the civilized world and finally attained the position it occupies today.

But what of the future? There is no question but that the future of gas is bright. All of us gas men should be proud, should feel it an unqualified privilege and an opportunity whose limits of development are unbounded, to be associated with gas. It is the universal fuel. Its field is everywhere that heat is required. Its eventual use by all industries as the best, most economical in a broad sense and most efficient fuel, will undoubtedly come with time. It is up to the gas man himself to be sold unequivocally and irrevocably on this idea.

When gas, once an unsolved, fearful mystery, now one of Man's most valued servants, finds itself, when the men who work for and with it are themselves convinced of the inevitableness of its great future, when all of us pull together to advance the cause of gas, then the future which is portented to be so full of promise, will be attained, and our brave slogan, "If it's done with heat, you can do it better with gas," will be acknowledged by all, and our goal, gas the universal fuel, will be attained.

An Acknowledgment

In conclusion, the author wishes to acknowledge his indebtedness to the American Gas Association for rendering its historical files available to him and to the various papers and publications that were found there, in particular Dr. Norman's valuable book, as well as to the various gas companies who so kindly co-operated with him and made it possible for him to obtain valuable and interesting historical information and photographs.

GAS MEN

WELCOME TO THE SIXTH ANNUAL CONVENTION OF THE A. G. A.

The American Gas Journal takes great pleasure in welcoming the gas men to this Sixth Annual Convention of the American Gas Association.

In this issue of the American Gas Journal we celebrate the sixty-fifth year of continuous service that the Journal has been giving to the American Gas Industry. It is our great privilege to be the oldest gas paper for serving the gas industry longest of all, and it is our aim to continue giving better and better service to the gas men of the country.

The American Gas Journal will appear in five issues, this being the first, covering each day of the Convention. The Daily Issues will be distributed free every morning at all the principal hotels, and at all the booths on the Steel Pier. A copy will also be mailed to all our subscribers every day from Atlantic City.

We invite all gas men to visit our booth, No. 169. Extra copies of the Journal will be found there, and we have installed a telephone for the use of the gas men and their friends. At our booth will also be found attendants who will handle all your calls, take messages and answer all questions. The telephone number is Marine 5744. If you want your office to call you during the day, call this number.

We hope that the gas men will have a splendid time at this Convention, an entertaining time as well as an instructive time, and we shall be glad to do all we can to make their stay pleasant.

Our editorial office will be in the Chalfonte Hotel, and items for publication in the dailies can be left at our booth or at our editorial office.

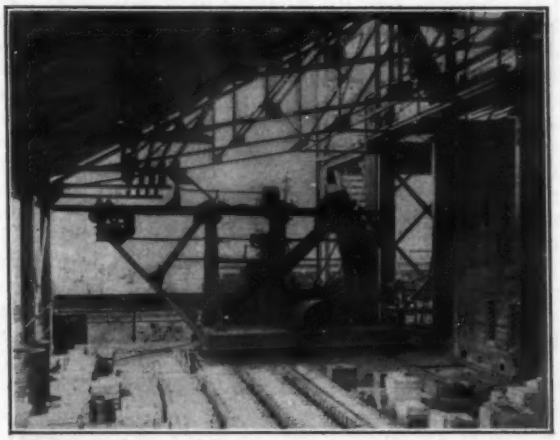
Call upon us! We are here at your service!

New Coal Carbonizing Plant at Danbury, Conn.

The Description of Equipment and Novel Features

THERE is now being constructed for the Danbury & Bethel Gas and Electric Light Co., Danbury, Conn., a new coal carbonizing plant of the horizontal gas oven type.

This plant consists of a steel oven building in which is located a battery of 12 horizontal gas ovens. The ovens are equipped with an independent producer for providing the heating gas for each bench of 3 ovens. Electrically operated machines, such as pusher and coal charging larry are provided and an inclined coke wharf is located along the discharge sides of the ovens, this wharf having a 24-hour coke storage capacity. The coke is distributed over the wharf from each oven by means of a hand-operated deflector car. The oven battery is equipped with a return liquor system so arranged that ovens may be operated with either a wet or dry main. Complete coal and coke handling apparatus is provided for receiving coal from railroad cars, passing it through the ovens and for delivering quenched coke to a screening plant or to storage.



Coke Pusher

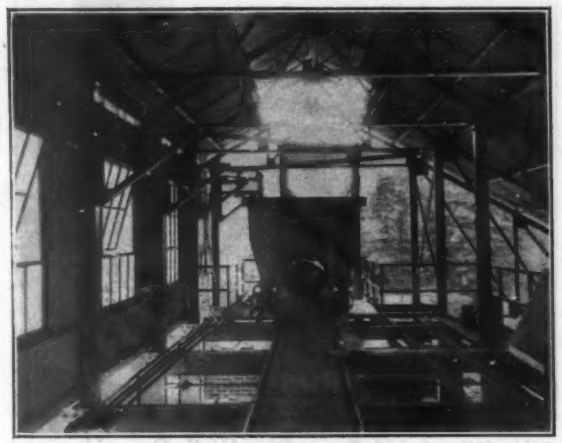
Special Features

In every particular the carbonizing is complete up to the outlet of the foul main. Some of the special features applied to this plant are found in the design of the ovens, such as the method of heat control of the heating system; the self-sealing oven doors; and in the special details of construction of the oven masonry. The arrangement of the pusher is of a somewhat radical departure from previous machines of this type. It is so arranged as to require spotting but once in front of each oven for the complete operation of door removal, pushing, door replacement and leveling. This machine is provided with the usual safety device making it impossible to operate the ram and the levers simultaneously, or to move the machine along the traction rails when operating either ram or leveler.

The Building

The building is a steel frame covered with a monitor type of corrugated transite. The pusher floor is of steel construction throughout, as is also the charging floor above the ovens. No siding is provided for enclosing the building, with the exception of 6 panels between the top of the oven battery and the roof.

The oven battery consists of 4 benches of 3 ovens each, the ovens being 12 inches wide, 8 feet high and 13 feet 6 inches long. Each oven will be charged with approximately 2 tons of coal every 12 hours and the plant will therefore have a capacity of approximately 500,000 cu. ft. of gas and 33 tons of coke per day.



Coal Larry

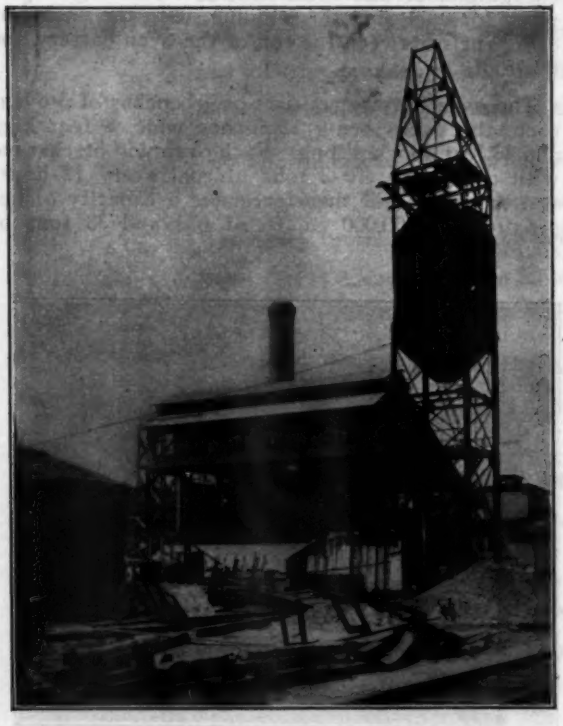
The producers for providing the heating gas will consume either coal or coke fuel, including a fair proportion of coke or coal breeze with the lump fuel. Each producer has a gas duct for the return of waste gases under the grate by means of a steam injector. A patented system of heat control is incorporated in the flue system of each bench whereby an even temperature may be maintained throughout the length of the ovens. The heating walls of

the ovens are built of interlocked silica blocks of varying thickness, this dimension being changed in accordance with the requirements for the transfer of heat from the heating flues through the oven wall at different points in the oven. The oven roofs are insulated to such an extent as to prevent overheating of the gas above the top of the charge. Each bench is provided with a pair of tubular recuperators, from which waste gases pass in a divided stream to the injector and underground flue leading to the chimney.

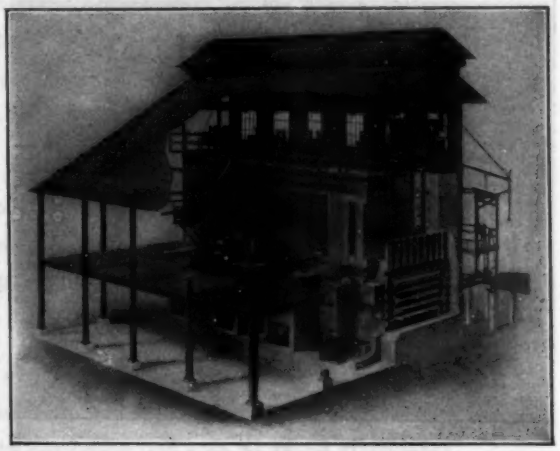
The Hydraulic Main

Each bench is equipped with a separate hydraulic main, each provided with a quick opening dip-regulator so arranged that the level of the liquor may be maintained slightly above or considerably below the bottom of the dip-pipe, thus providing for operation with a so-called dry-main and for sealing the dip-pipes when any oven in a single bench is opened. At the end of the battery there is a tar settling tank from which light liquor is returned to the mains, by means of a motor driven sump pump. The return liquor may be sent directly into each hydraulic main or through a spray above the gas off-take pipe which connects each hydraulic main with the foul main. The foul main extends the entire length of the battery passing out of the building through the monitor and above the quenching wharf beyond it is connected to a primary washer. Heavy tar passes from the settling tank direct to the tar well, and the tank is so arranged that practically any desired gravity of liquor may be produced in the tank so that there is a possible control over the quantity and quality of light liquor returned to the hydraulic mains.

The oven doors are of a self-sealing type, having a metal-to-metal contact between the door frame and the lid. The jamb blocks in which the frame is set are insulated thereby protecting the frame from excessive heating and providing practically cool walls along the front and rear of the battery.



Coke Wharf and Oven, Pier Wall, Oven House and Coal Bunkers



Unit Carbonizing Plant, 500,000 cu. ft. Initial Capacity

The door lids are completely removable, not being hinged, and when closed are held in place by means of a screw latch operated by a hand-wheel and which arrangement permits of any desired contact pressure for holding the lid snug against the frame and making a gastight joint. The whole set of three doors for each bench are firmly attached to the pier-wall buckstays of the battery.

Coal Charging Car

The coal charging car or larry is electrically operated by means of the usual motor, trolley car control and third-rail power system on the charging floor above the top of the ovens. Coal is received from a storage bunker at one end of the building and each charge is weighed when being drawn from the bunker, the larries standing on track scales which are located in the floor directly under the dis-

charge gates. The larry is provided with two vertical discharge spouts one on each side of the rails, and which are dropped into two oven charging holes. The hopper body of the larry is divided through the center so that one-half of the charge is directed through each charging hole. This arrangement provides against more than a desired amount of coal falling into one end of an oven.

The Pusher

The pusher is electrically operated and of the single spotting type. All power movements of this machine are accomplished by means of a single motor and a series of gear shifts. The machine is brought to a central position in front of the oven by means of a gear and friction drive. In order to make the next move the operator is compelled to disengage the traction mechanism. The door is removed by the use of the pusher ram upon which it is brought from its position on the door frame back into a receiving frame on the pusher. In the receiving frame the door is lifted off the ramhead and moved to one side by means of a hand operated worm and cam device. The charge is then pushed, the ram withdrawn from the oven, the receiving frame with the door brought back to a central position and the door lowered on to the ramhead. The door is then pushed forward on to the oven door frame where the operator latches it into position and opens a self-sealing leveling door placed in the upper portion of the oven door frame. Coal is charged into the oven and the pusher operator then levels it. The pusher machine is so geared that a motor must be taken out of engagement with the ram before the leveler can be operated. The pusher is of heavy steel construction throughout provided with a motor, trolley car type control, oil switch, etc., and receives power from a third-rail system located under the oven house roof at the rear of the pusher frame.

Handling the Coke

On the discharge side of the ovens there is a hand operated deflector car through which the coke passes from an oven to the quenching wharf. The deflector car is provided with a hand operated door lifter and only one man is required on this side of the ovens to remove the door, replace it, distribute the coke and operate the quenching valves. This man will also have ample time between oven charges to draw quench coke from the wharf on to the belt conveyor.

The coal and coke handling apparatus in general consists of a steel coal bunker having a capacity of 183 tons of oven coal. This bunker is filled direct from railroad cars by passing the coal through a track hopper into a skip-hoist which delivers it to the bunker. Coal is placed in storage by means of a drag scraper and reclaimed by the use of the same scraper back to the skip-hoist. Quenched coke is received from the quenching wharf conveyed into the skip-hoist and elevated to the top of the bin structure at which point it is passed over a screen to storage bins, or if required for bench fuel, is dropped into a circular bin suspended inside of the coal bunker, and from which producer fuel may be drawn through a chute down on to the pusher floor and taken to the producer charging holes by means of a charging buggy.

Scales are provided in the pusher floor directly beneath the fuel chute for weighing the fuel used in the producers.

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NEWS OF THE GAS INDUSTRY

Dr. Wilbert J. Huff Appointed to Give Gas Courses at Johns Hopkins

The Johns Hopkins University has just announced the appointment as professor of gas engineering of Dr. Wilbert J. Huff, lately of the Koppers Company, Pittsburgh. Dr. Huff has already assumed the duties of his new position and will have charge of the organization and instruction of the new courses in gas engineering at Johns Hopkins University.

Dr. Huff was born at Butler, Pa., on October 4, 1890. He is an honor graduate of Yale College, class of 1914, and received the rating of Philosophical Oration, which is the highest honor awarded. He also received special honors in chemistry. He took the degree of Doctor of Philosophy at Yale in 1917. While a graduate student at Yale he was Henry Bradford Loomis Fellow, a high honor, and during this period he engaged in teaching.

Since 1917 Dr. Huff has been engaged in chemical and engineering research with the Barrett Company, the United States Bureau of Mines and the Koppers Company. He was a lieutenant in the Chemical Warfare Service, in command of the Princeton research detachment. Since 1920 he has been with the Koppers Company, in charge of the research division of the Koppers Company Laboratories. He has had under his direction a number of men engaged in various research problems connected with the by-product coke and gas industry, some in the laboratory, others in the field. This work has taken him over a wide section of the country and into all phases of the gas industry.

In extending the invitation to Dr. Huff, the university acted only after very careful consideration of a large number of men who had been suggested as suitable for the

new chair, and after consultation with many experienced and influential men in the gas industry. The university feels that it has not only selected the best available man, but one having conspicuous qualifications in the fields of engineering practice, education and research. During the past year Dr. Huff has been to Baltimore several times, has conferred with the university authorities, has aided them in their deliberations, and has shown a vision and enthusiasm for the opportunities open in this new departure in the establishment of a Chair of Gas Engineering.

Dr. Huff stands ready at all times to co-operate with the men interested in the gas course, as well as all those who may have any suggestions to make for its improvement and advancement.

$50,000 Gas Extensions

Birmingham, Ala.—Construction of gas extensions to Pratt City, a suburb of Birmingham, is practically assured. It is estimated that these extensions will cost about $50,000.

At a conference held in Birmingham between citizens of Pratt City, members of the Birmingham City Commission and representatives of the Birmingham Electric Company, which company supplies the gas for the city of Birmingham and suburbs, it was shown that 350 customers were already signed up for these extensions. In addition to this, there are fully 700 prospective customers. This latter list will be canvassed by representatives of the Birmingham Electric Company. To cover the cost of construction 500 customers will be necessary, it is stated.

Three-Part Rate Is Supported by Committee

Carthage, Mo.—A recommendation that the three-part rate for paying for gas has been made to the Chamber of Commerce by the joint committee of the Chamber of Commerce and City Council. The report of the committee was adopted following a spirited discussion.

That the city would have no relief in the courts if the Carthage Gas Company carried out its threat to discontinue service after September 1, if a new franchise embodying the three-part rate was not granted, was the report made at the meeting by Frank Birkhead, former city attorney, who was employed by the committee to go to Jefferson City to investigate the legal phase of the situation.

The report of the joint committee, which was read by S. R. Morrow, follows:

"To the Chamber of Commerce:

"At a joint meeting of the Chamber of Commerce committee and the Council committee on the gas situation, the following report was adopted unanimously:

"Your committee begs to report that it has investigated the gas situation in the city of Carthage and after due study of the matter makes the following recommendations:

"First—That in view of the extensive use of gas in the city of Carthage, our wish to be fair with the Carthage Gas Company, and our belief in the merits of the theory, the Chamber of Commerce go on record as being willing to concede the theory of the three-part plan, as a basis for arriving at a rate to be charged for gas in the city of Carthage.

"Second—That a committee be appointed to confer with a committee from the City Council and representatives of the Carthage Gas Company, with an idea of having the charges to be applied to the three-part plan fixed by a proper rate-making body.

"Your committee from the Chamber of Commerce further reports that after going into the matter they find the tendency of the courts, rate-making bodies and engineers leaning strongly to the principles in rate-making similar to those embodied in the three-part plan.

"Your committee has not only taken the merits of the three-part plan into consideration in recommending its adoption, but has also considered it as a possible solution of the gas problem in Chicago.

"Your committee further reports that after a preliminary examination it believes a revision should be made of the charges that the gas company suggested be applied to the three-part plan in Carthage.

"Respectfully submitted,
"C. S. Boggess, Chairman.
"W. A. Turner,
"Roy Morrow,
"Millard BBryan,
"C. C. Carter."

More Directors for Gas Concern

Auburn, Wash.—Names of two more prominent Auburn men have been added to the list of directors of the Valley Gas and Fuel Company. They are Claude Calavan, cashier of the Auburn National Bank, and W. W. Downing, real estate and insurance man. Other members of the board are C. R. Clark, C. R. Collins, W. J. Gregoire, Harry M. Leslie, R. E. May and A. F. Netzel.

Satisfactory progress is being made in the work of preparing the local system for operation and perfecting the organization. Taking advantage of the condition of streets in the southwest part of the city preliminary to paving, the company has gone over its mains in that vicinity and found them in splendid shape.

"Industrial plants use gas because it furnishes quick and economical heat," explained Mr. Collins, president of the company. "Auburn garages and other industrial plants will use gas. The Borden condensery will be a large user. Other industries will be attracted to Auburn because of having gas. An important industry has already signified its desire to build its plant in Auburn provided gas can be had. The city of Auburn and its citizens will quickly realize that gas is an industrial magnet that will bring new factories, new payrolls and greatly increase the importance of Auburn as an industrial center.

"This city with its advantage as an important railroad center will continue to grow as an industrial city. A gas supply will increase this growth. Auburn in 1910 had 957 people, it now has 5,000. There are more than 1,100 homes and business places. Under these conditions the Valley Gas and Fuel Company will be prosperous. Investment in the bonds of the company will assure a bigger and better Auburn."